



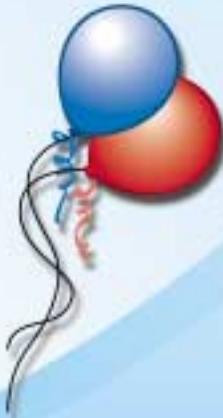
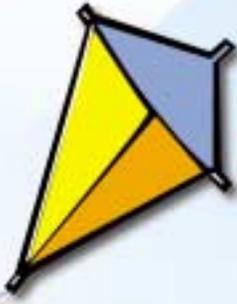
National Aeronautics and
Space Administration
Glenn Research Center
Cleveland, Ohio

Educational Product

Students Grades K-2

EG-2002-04-006-GRC

Aero Adventure Activity Book



For kids!

Acknowledgments

I would like to thank the Aero Adventure Activity Book team for their invaluable suggestions and fortitude to see this book come to fruition. Thanks also to the teachers that provided our team with ideas and feedback, and most important, the Glenn Research Center Aeronautics Directorate for funding this outreach activity.

Susan Johnson

Aeronautics Directorate, Subsonic Systems Office
Aero Adventure Activity Book Team Lead

Team Members

Carol Galica, Office of Educational Programs

Kelly Ison, Subsonic Systems Office

Shanessa Jackson, Office of Educational Programs

Marge Lehky, Office of Educational Programs

Kelly Shankland, Logistics and Technical Information Division

Linda Skrada, Subsonic Systems Office

Renee Yoder, Office of Educational Programs

Introduction

NASA conducts research for aeronautics too! This Aero Adventure Activity book has been created to introduce some basic aeronautics terms for children attending kindergarten through second grade. We want them to realize that many aeronautics terms and concepts surround them every day. A variety of activities are presented to show how an alphabet letter can be related to an aeronautics concept and basic aeronautics terms. The child is invited to look at each of the letters, trace the letter, and print the letter in the space provided. We hope they enjoy doing the activities too. Answers to the activities can be found on the last few pages of this book.

About NASA Glenn Research Center

The NASA Glenn Research Center (GRC) is world-renowned for its research contributions to aircraft engines. We are world class in providing advanced technologies to the U.S. industry making engines more reliable and efficient. We partner with industry to create more economical air travel for the public, using engines that pollute less and are quiet to operate. We also pursue breakthrough technologies that will allow us, one day, to travel above the speed of sound using supersonic and hypersonic air vehicles.

Please visit our web sites to learn more about NASA GRC aeropropulsion, aeronautics research, and outreach activities.

NASA Glenn Beginner's Guide to Aeronautics

<http://www.grc.nasa.gov/WWW/K-12/airplane/>



NASA Glenn Aeronautics Directorate

<http://www.grc.nasa.gov/WWW/AERO/aero.htm>

NASA Glenn Visitor Center

<http://www.grc.nasa.gov/Doc/visitgrc.htm>



NASA Glenn Office of Educational Programs

<http://www.grc.nasa.gov/WWW/OEP/>

Web sites at other NASA centers:

"Off to a Flying Start"

<http://ltp.larc.nasa.gov/flyingstart/>



Aerospace Team Online

<http://quest.arc.nasa.gov/aero/>

National Math and Science Standards

	A	B	C	D	E	F	G	H	I	J	K	L	M
Mathematic Standards													
Number and operations			✈		✈	✈		✈					✈
Algebra													
Geometry		✈		✈									✈
Data analysis and probability		✈	✈	✈	✈		✈	✈	✈	✈	✈		✈
Problem solving	✈	✈	✈	✈	✈	✈		✈	✈	✈	✈	✈	✈
Reasoning and proof	✈		✈			✈	✈	✈	✈	✈	✈	✈	✈
Communication													
Connections	✈	✈	✈	✈	✈	✈	✈	✈		✈	✈	✈	✈
Representation	✈	✈	✈		✈	✈		✈					✈
Science Process Skills													
Compare	✈	✈	✈		✈	✈		✈	✈	✈	✈	✈	✈
Describe													
Sort	✈	✈	✈		✈	✈			✈			✈	
Predict						✈					✈		
Manipulation		✈		✈			✈		✈			✈	✈
Classification						✈						✈	✈
Grouping			✈			✈		✈	✈	✈	✈		
Interpret data	✈	✈	✈	✈	✈	✈	✈	✈		✈	✈	✈	✈
Make models							✈						
Inferring	✈	✈	✈	✈		✈		✈	✈	✈	✈	✈	✈
Observing	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
Science Content Standards K-4													
Physical science	✈	✈	✈	✈	✈	✈	✈		✈		✈	✈	✈
Position and motion of objects	✈	✈	✈	✈	✈	✈	✈		✈			✈	
Properties of objects/materials		✈			✈						✈	✈	✈
Unifying concepts/processes	✈	✈	✈	✈		✈	✈	✈	✈	✈		✈	✈
Evidence, models, and explanation	✈						✈	✈	✈	✈		✈	✈
Form and function	✈	✈	✈	✈		✈	✈		✈	✈		✈	✈
Earth science			✈	✈		✈					✈		
Objects in the sky		✈	✈	✈	✈							✈	
Changes in earth and sky											✈		
Science and technology	✈	✈			✈		✈		✈	✈		✈	✈
Abilities of technological design	✈	✈			✈		✈			✈			
Understand science/technology					✈				✈	✈		✈	✈
Scientific inquiry	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈

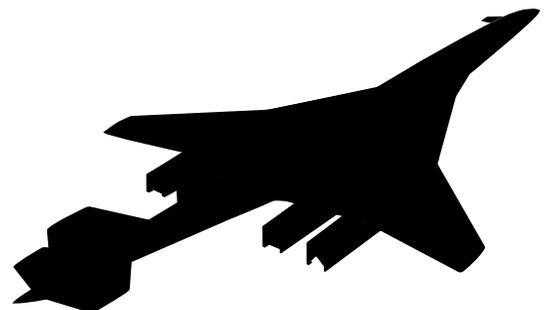
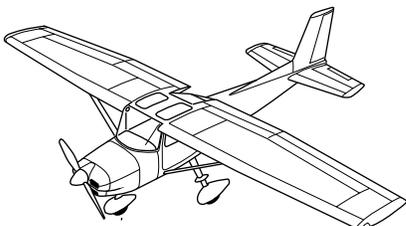
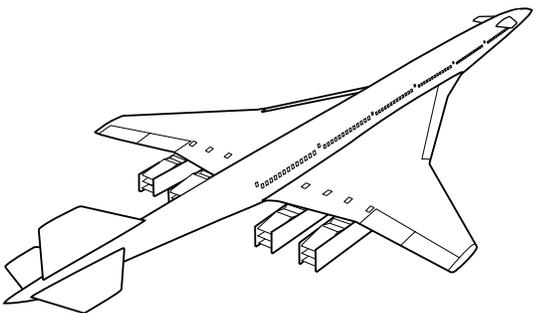
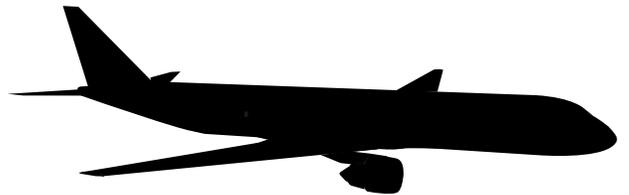
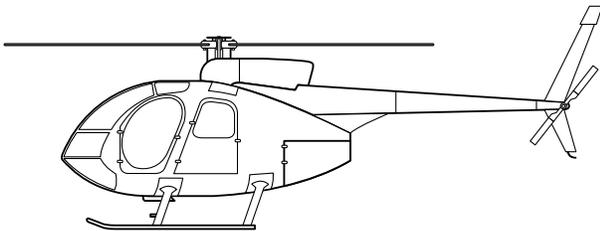
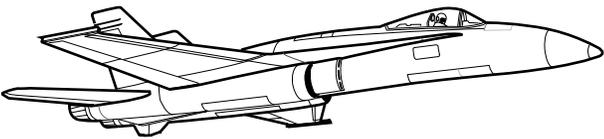
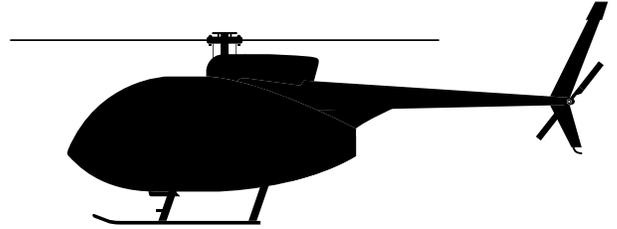
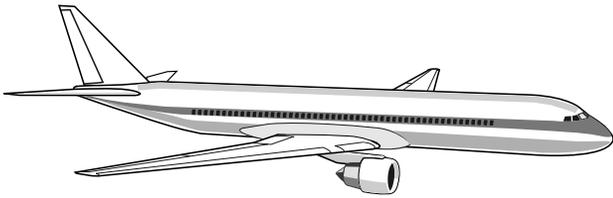
National Math and Science Standards

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Mathematic Standards		✈											
Number and operations	✈					✈	✈					✈	✈
Algebra													
Geometry			✈			✈			✈	✈	✈		
Data analysis and probability	✈		✈	✈			✈	✈	✈	✈		✈	✈
Problem solving	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
Reasoning and proof			✈		✈	✈	✈		✈		✈	✈	✈
Communication													
Connections	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
Representation	✈	✈	✈	✈		✈	✈	✈	✈	✈	✈	✈	✈
Science Process Skills													
Compare		✈	✈	✈			✈	✈	✈	✈	✈		✈
Describe						✈			✈		✈	✈	
Sort	✈	✈	✈				✈	✈					
Predict													
Manipulation	✈		✈		✈	✈	✈	✈	✈		✈	✈	
Classification			✈										
Grouping		✈				✈		✈					✈
Interpret data	✈	✈	✈	✈	✈		✈	✈	✈	✈	✈	✈	✈
Make models						✈			✈		✈	✈	
Inferring	✈		✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
Observing	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
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Physical science			✈	✈		✈	✈	✈	✈	✈	✈		✈
Position and motion of objects		✈	✈	✈		✈	✈	✈	✈	✈	✈	✈	✈
Properties of objects/materials						✈	✈	✈					
Unifying concepts/processes	✈		✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈
Evidence, models, and explanation	✈		✈	✈		✈			✈	✈	✈	✈	✈
Form and function	✈		✈			✈	✈	✈		✈			
Earth science						✈	✈	✈					✈
Objects in the sky					✈	✈	✈						✈
Changes in earth and sky													
Science and technology		✈	✈	✈		✈	✈	✈		✈	✈	✈	✈
Abilities of technological design			✈	✈		✈			✈	✈			
Understand science/technology			✈	✈		✈	✈	✈		✈	✈	✈	✈
Scientific inquiry	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈	✈

Aa Aa

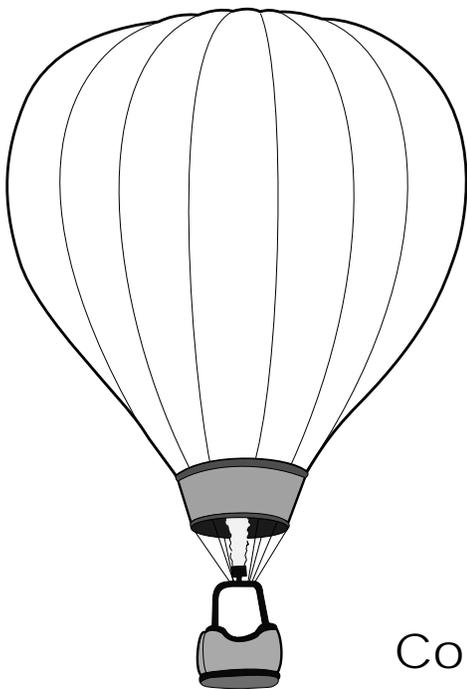
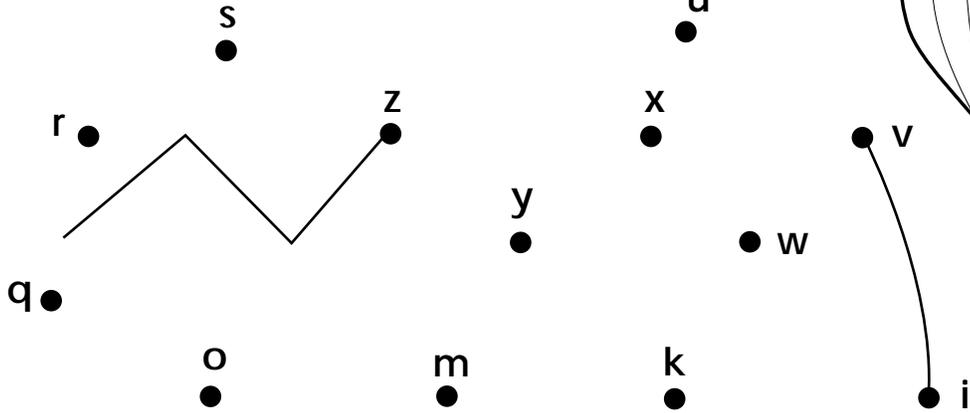
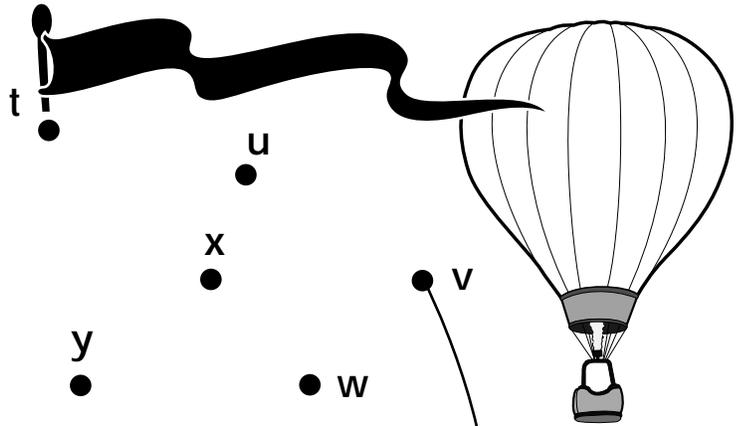
aircraft

Draw a line to match each aircraft to its shadow.

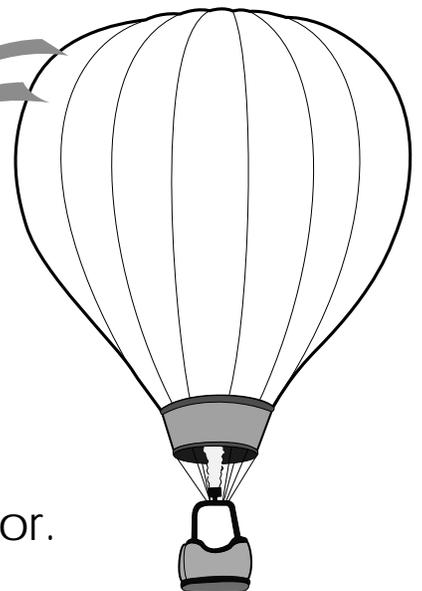
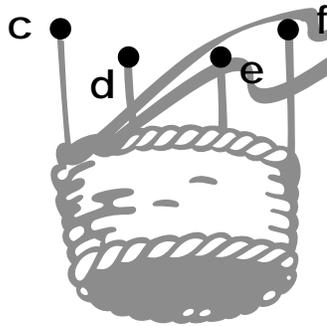


Bb Bb

balloon



b g

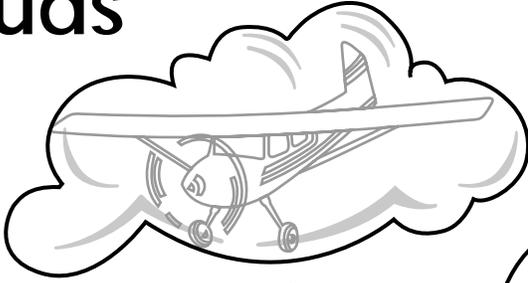


Connect the dots and color.

Cc Cc

clouds

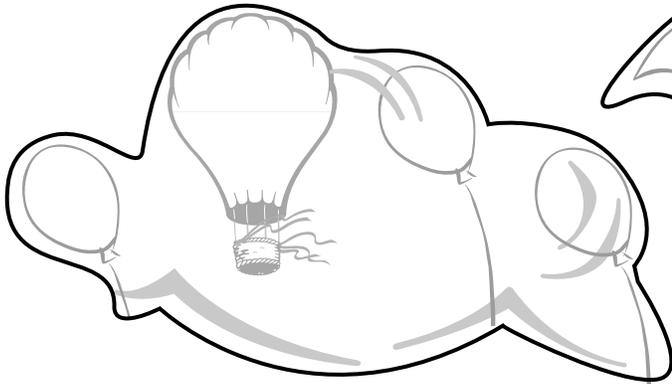
Count the pictures hidden in the clouds.



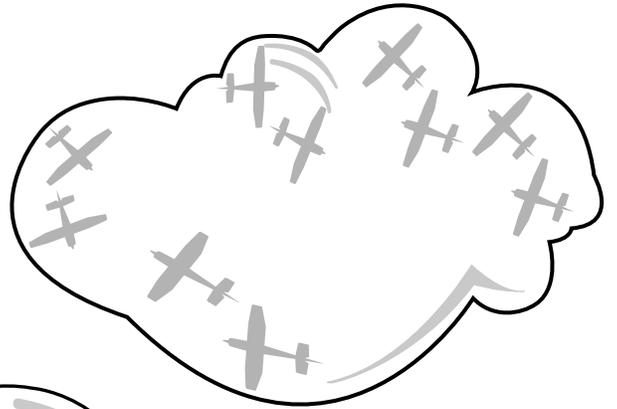
1



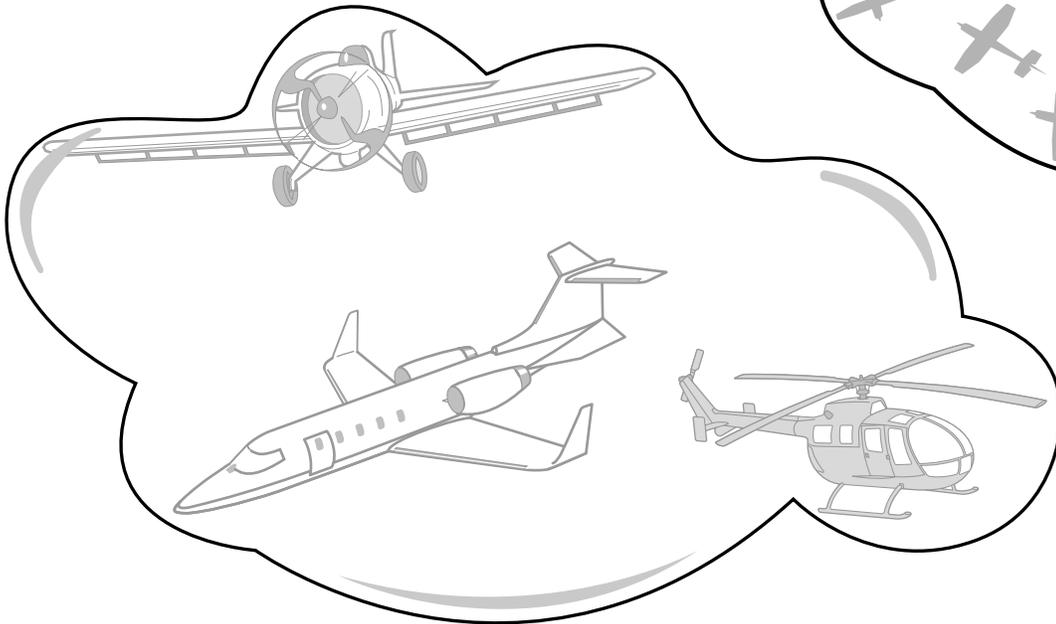
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—

Dd Dd

down

Follow the line and help the skydiver guide the parachute **down** to the target.



Ee

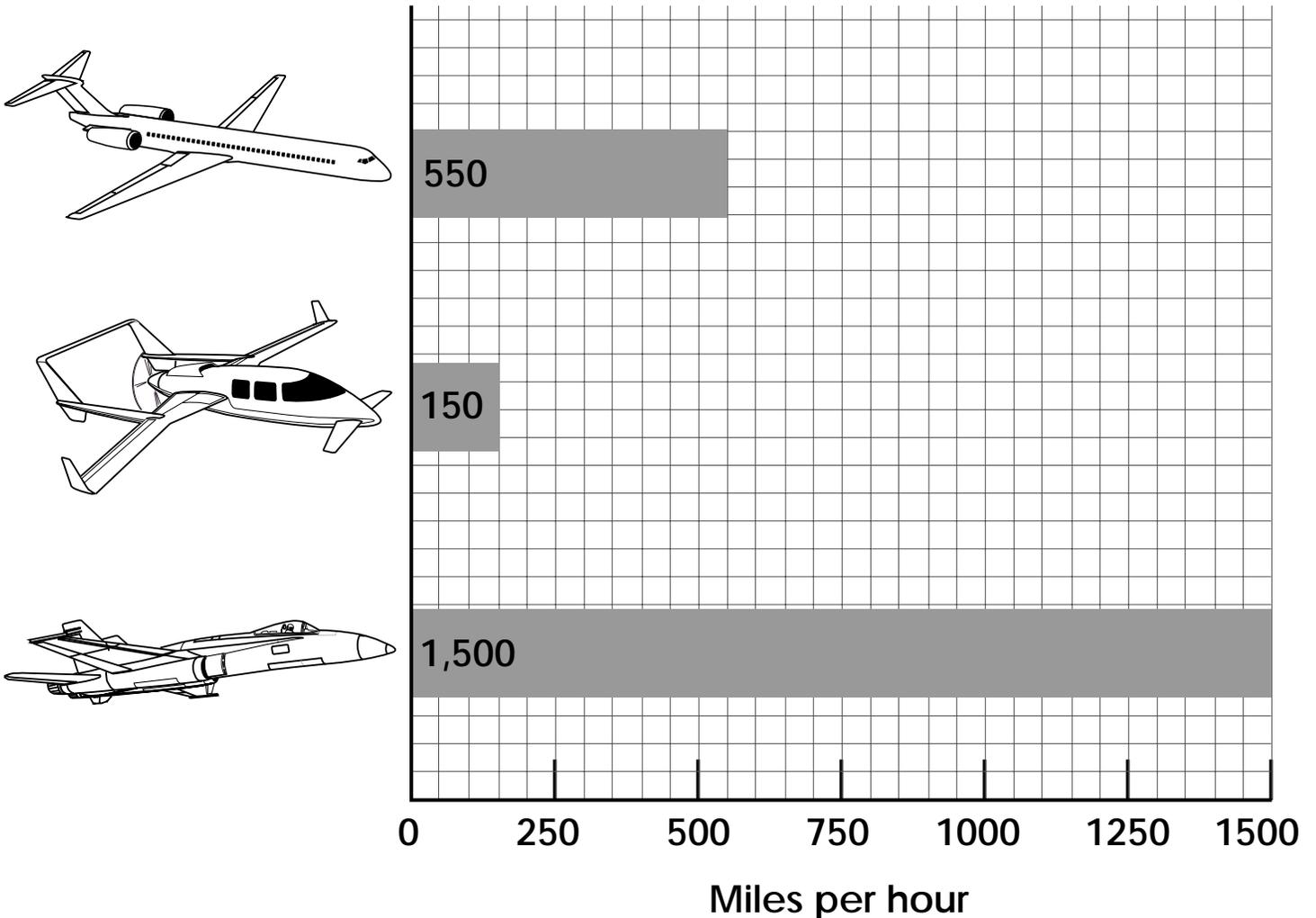


engine

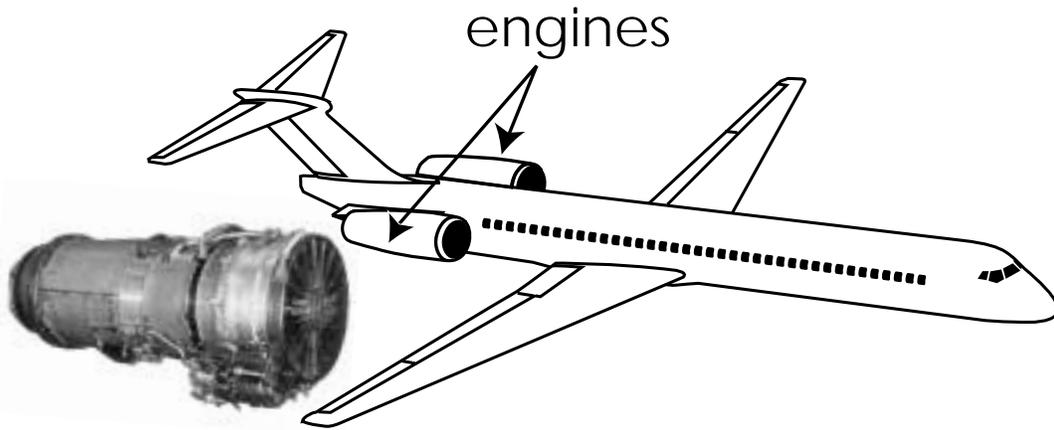
Each aircraft has a different type of **engine**. The engine moves the aircraft through the air at different speeds.

A passenger jet  flies through the air at 550 miles per hour. A smaller private aircraft  flies through the air at 150 miles per hour. A fighter jet  flies through the air at 1,500 miles per hour.

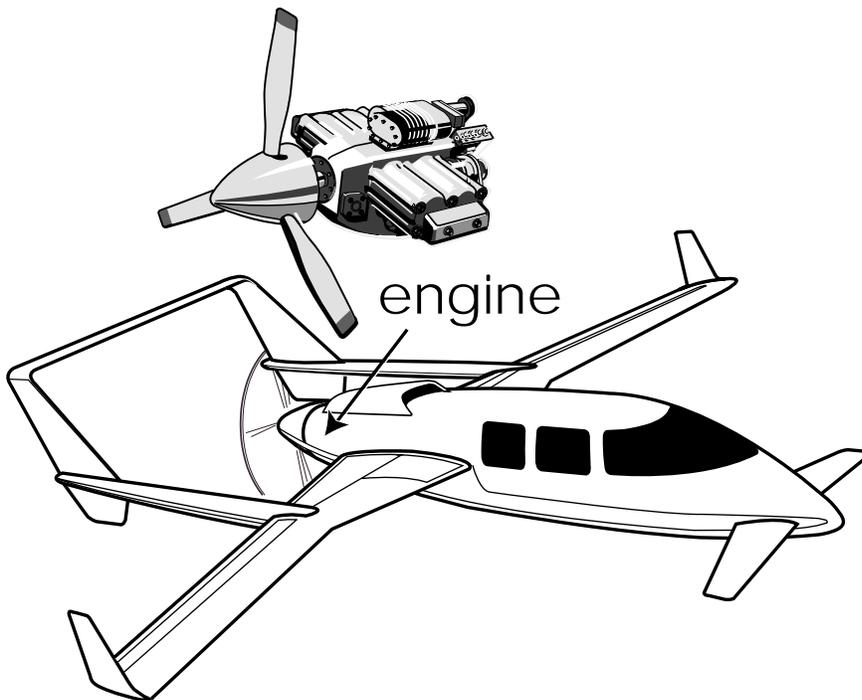
The chart below shows the speeds at which each aircraft flies. Use the graph below to complete the activity on the next page.



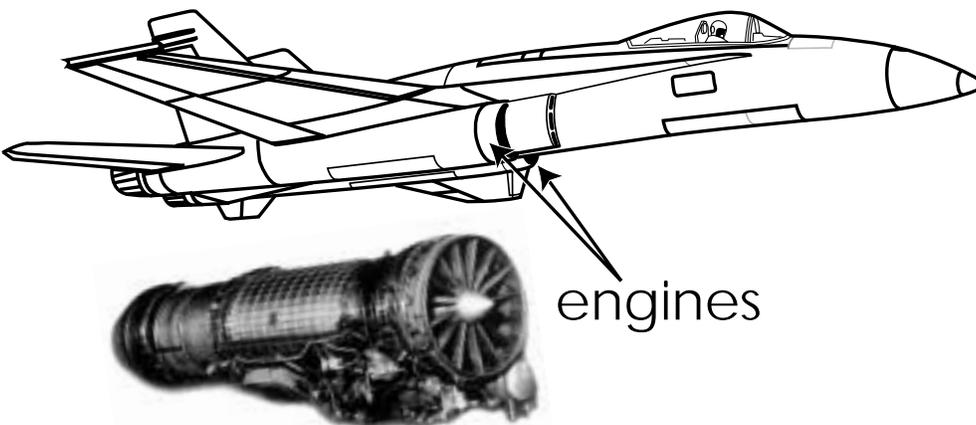
There was an airplane race. Draw a line from the trophy to the aircraft in the order it finished.



1,500 mph



550 mph

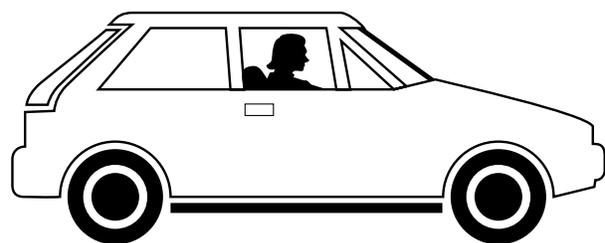
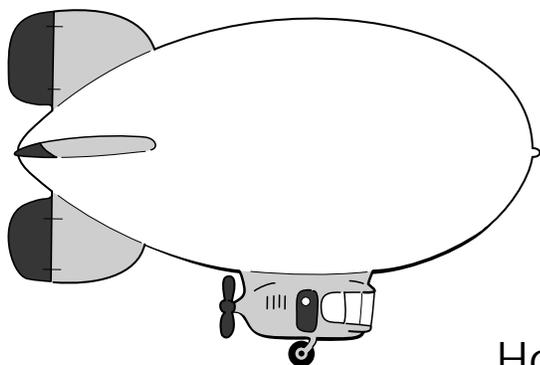
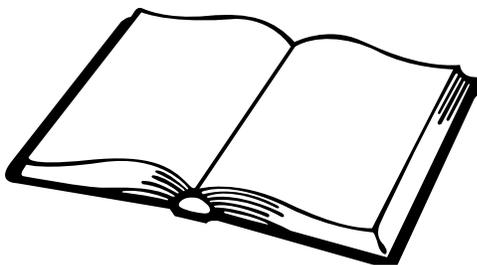
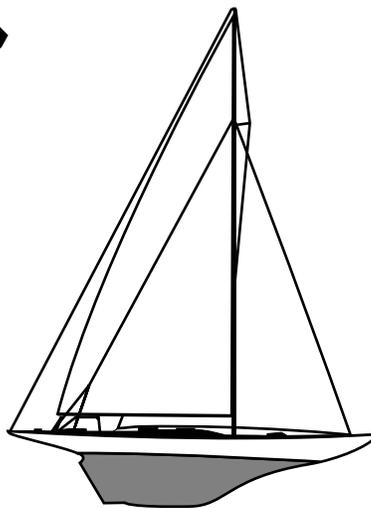
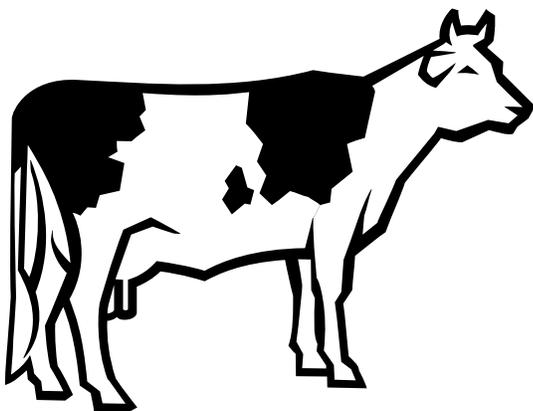
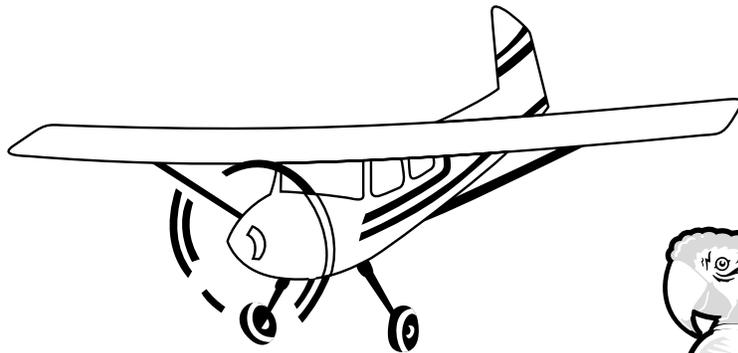


150 mph

Ff Ff

fly

Circle the pictures of the things that fly.



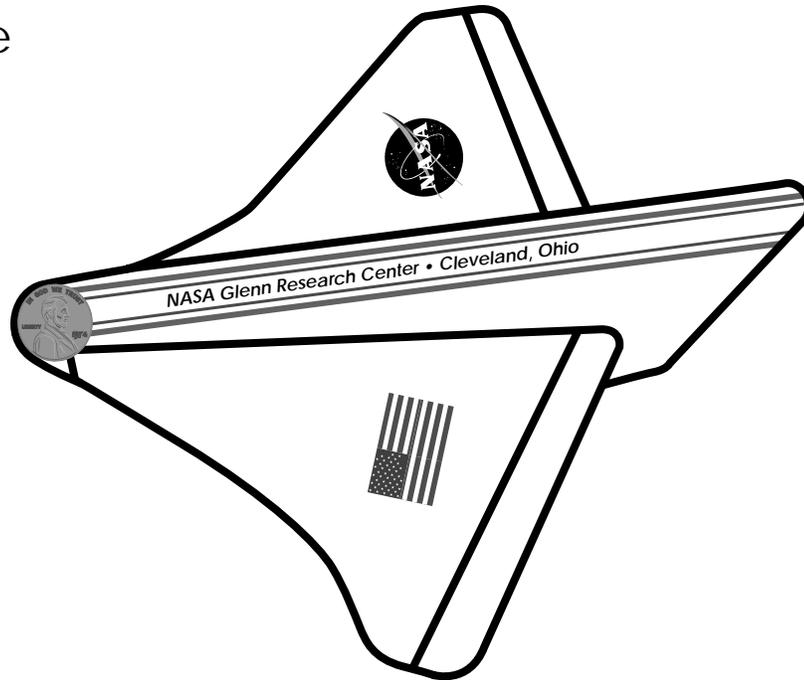
How many did you circle? _____

Gg Gg

Glenn glider

Materials Needed

Scissors
Cellophane tape
One penny



Instructions

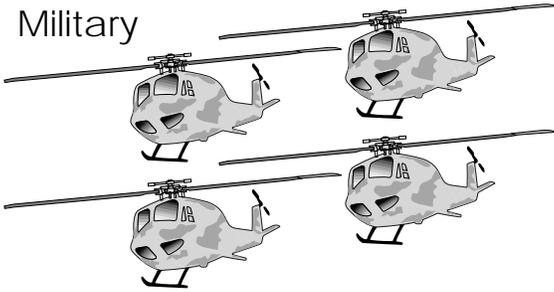
1. Cut out the wing and fuselage patterns that can be found on the back cover of this book.
2. Carefully cut on the wing slot line located on the fuselage.
3. Slide the wing into the slot making sure that the wing center line is within the fuselage.
4. Tape the wing to the fuselage.
5. Tape the penny to the nose of the fuselage for balance.
6. Bend both elevons upward.
7. Gently toss the **Glenn glider**.

Hh Hh

helicopters

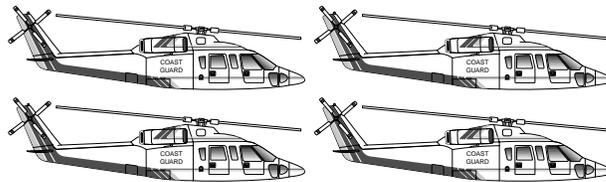
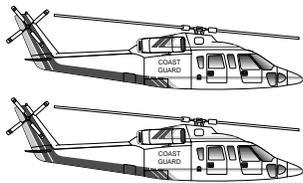
Add the **helicopters** in each group.

Military



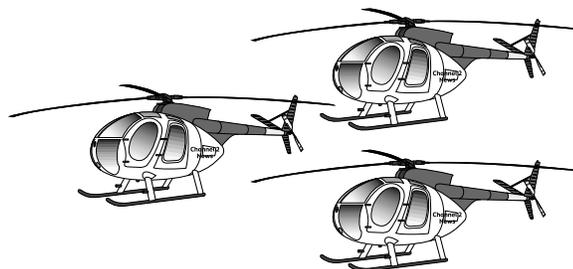
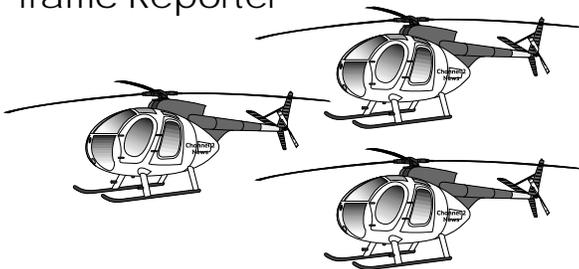
_____ + _____ = _____

Coast Guard



_____ + _____ = _____

Traffic Reporter



_____ + _____ = _____

Emergency Rescue

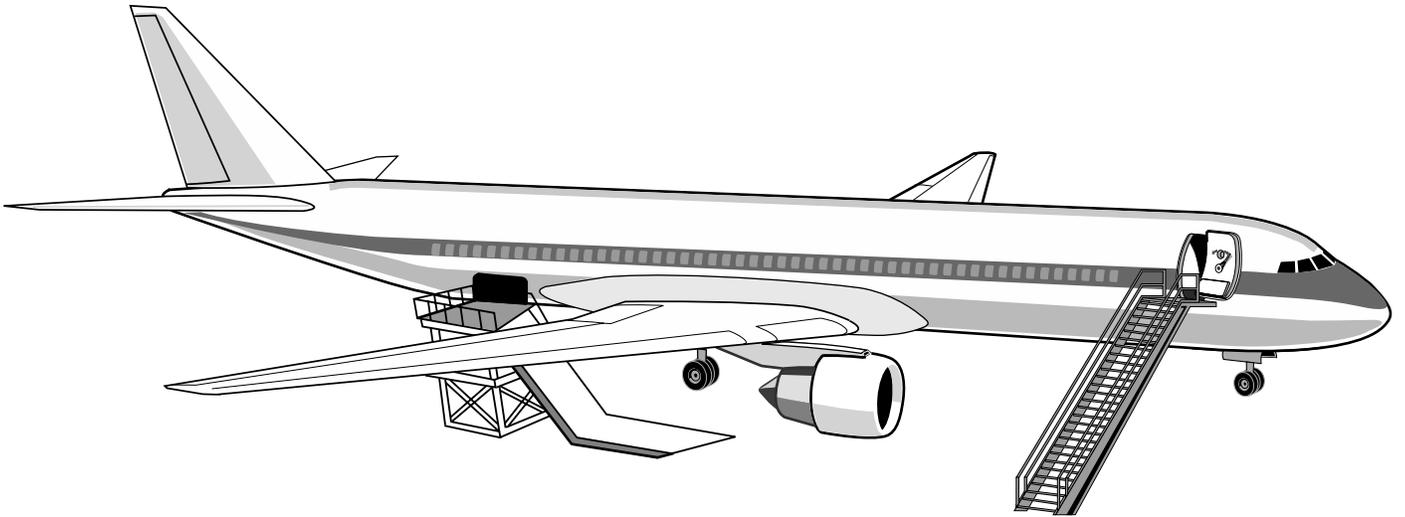


_____ + _____ = _____

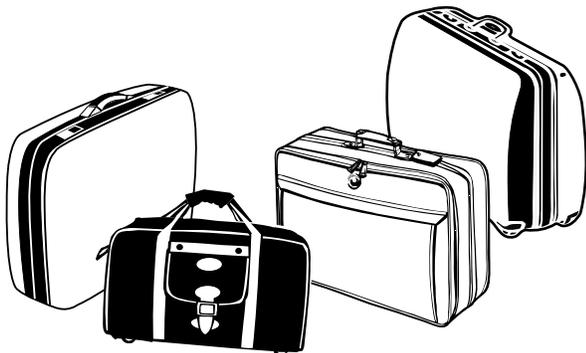
I i

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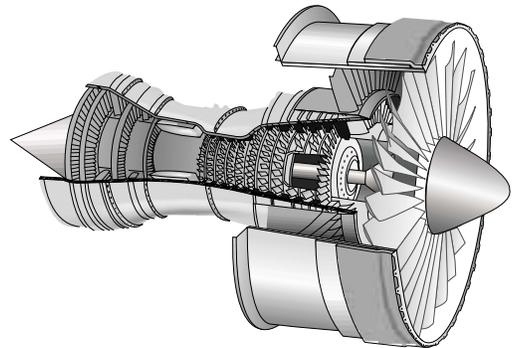
Draw a line to where the passengers, luggage, and engine go **into** the airplane.



passengers



luggage

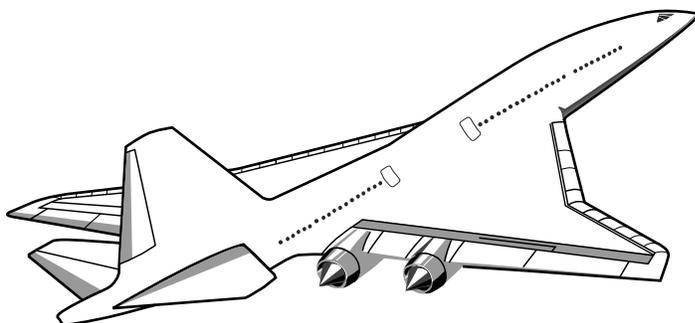
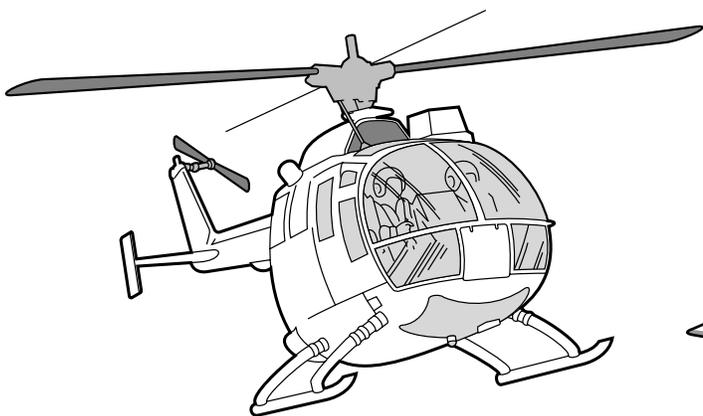
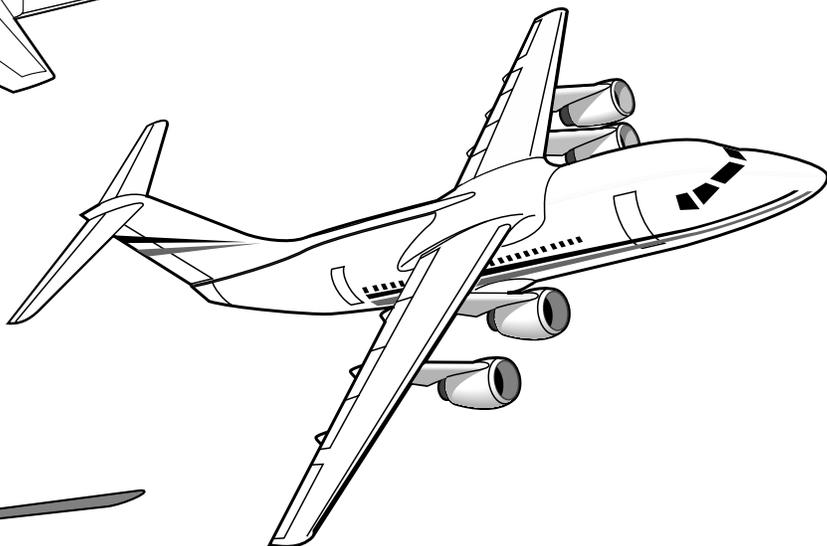
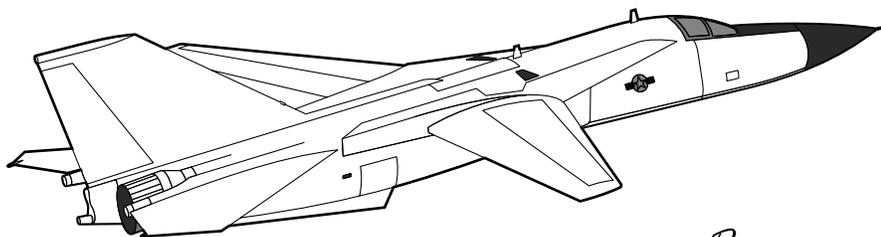
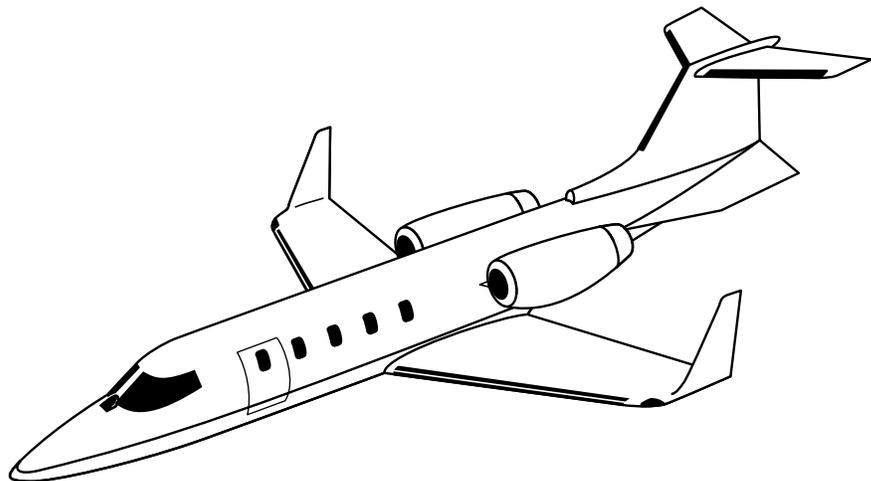


engine

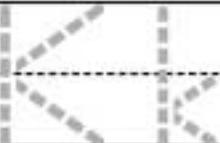
Jj

jet

Circle the aircraft
that is not a **jet**.

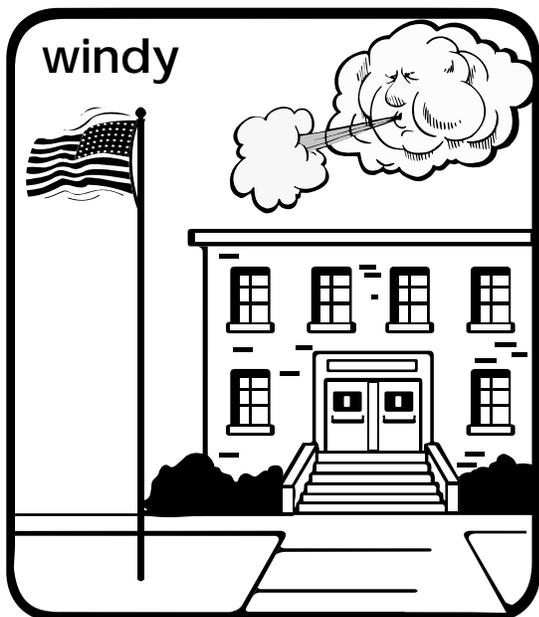
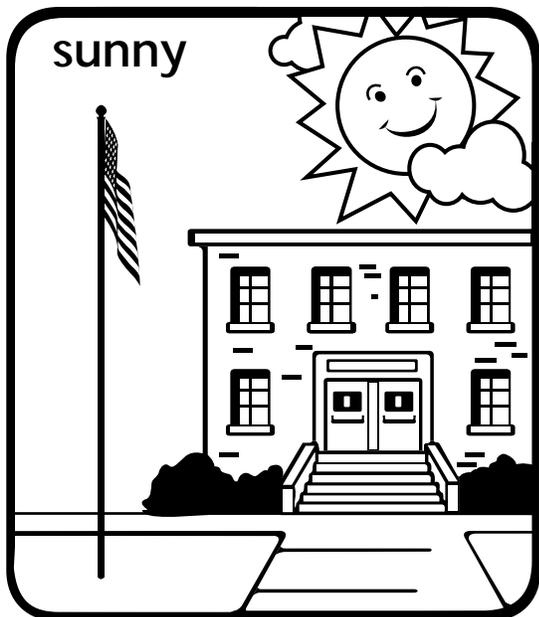
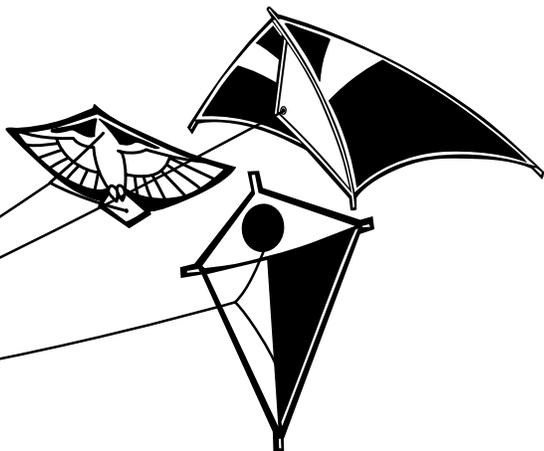


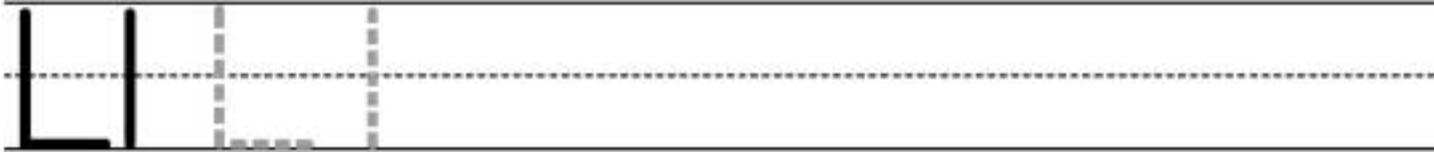
Kk



kite

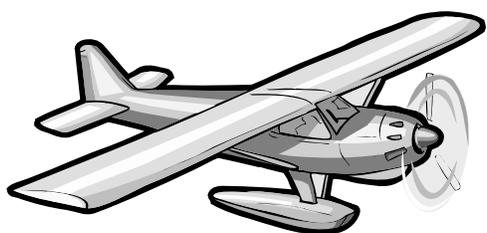
Color which type of day would be best for flying a kite.



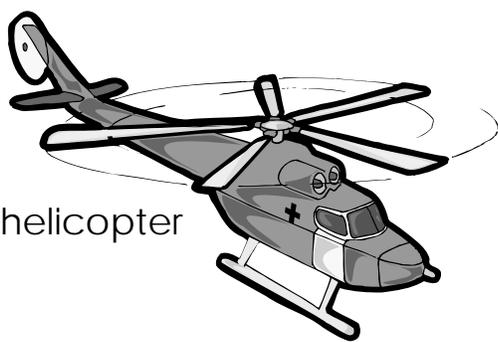
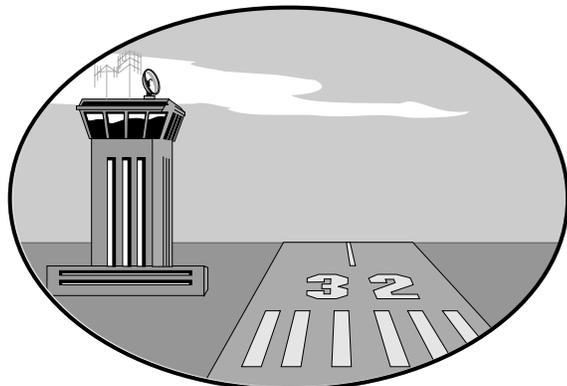


landing

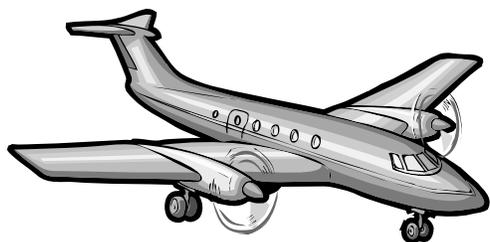
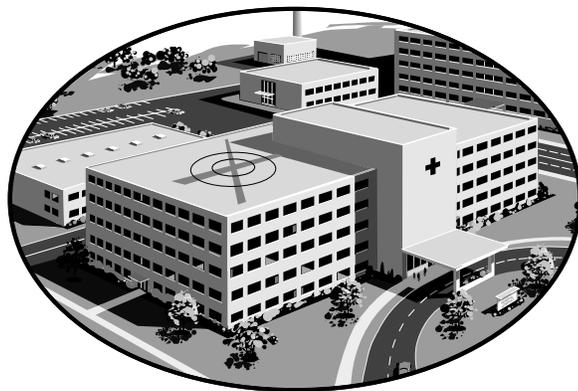
The aircraft below are **landing**. Draw a line to match each aircraft to where it would land.



seaplane



helicopter



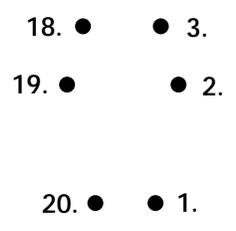
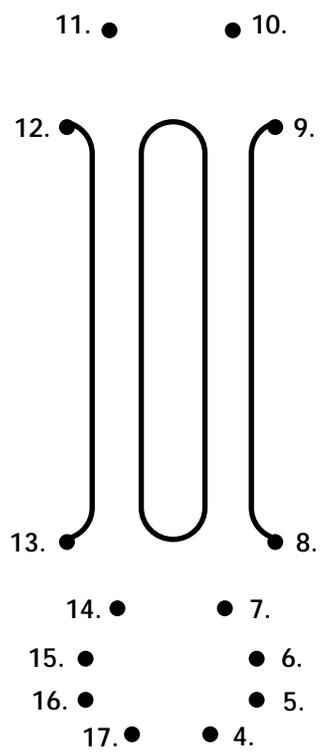
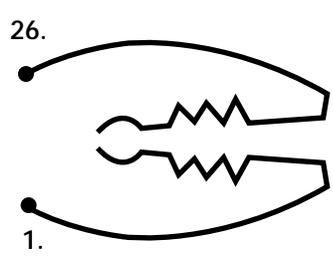
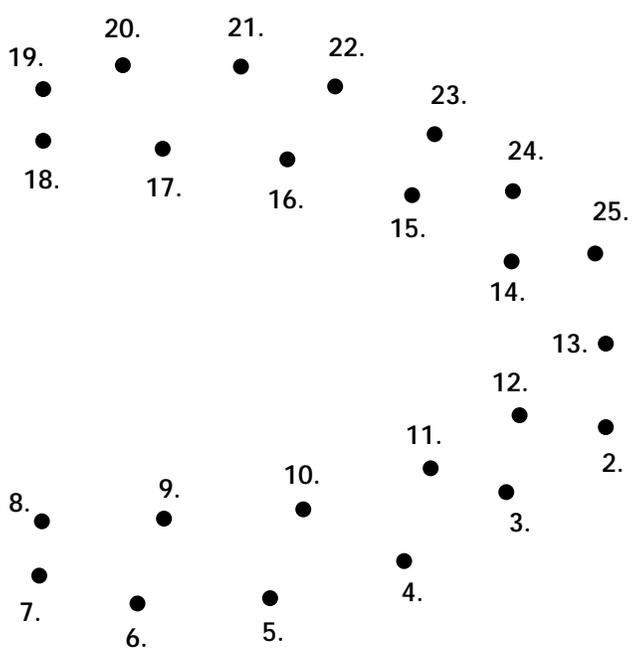
passenger plane



Mm Mm

mechanic

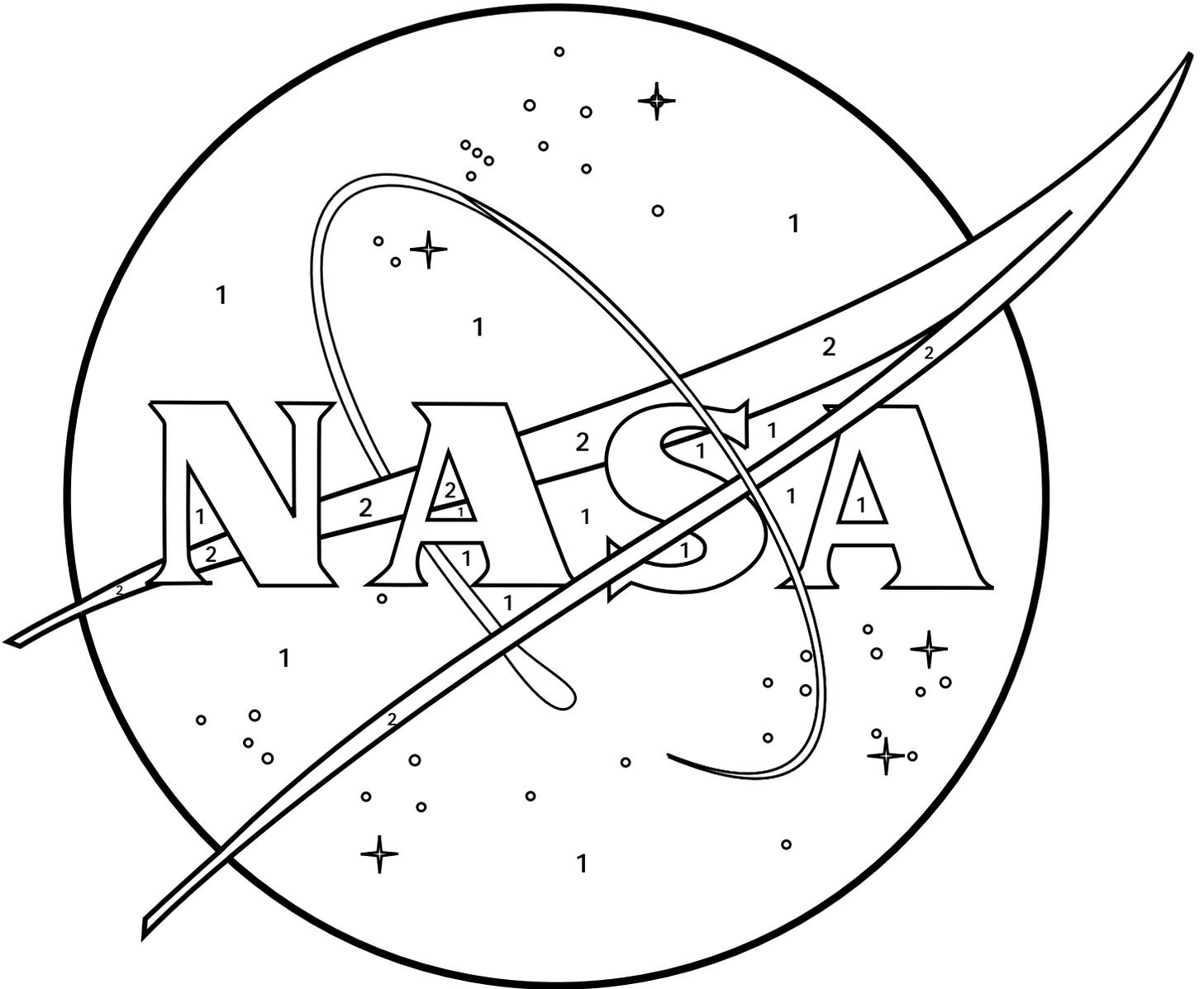
Connect the dots to see what type of tools a **mechanic** uses.



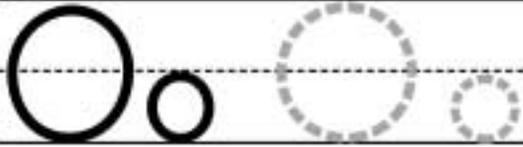
Nn Nn

NASA

National Aeronautics and Space Administration (**NASA**) logo.
Color parts of the NASA logo numbered 1 blue and 2 red.



The NASA Insignia (more commonly referred to as the "meatball") reflects the history and tradition of the Agency and is used in all of the Agency's day-to-day communications materials. Designed in 1959 by former NASA employee James Modarelli of NASA Glenn Research Center, the NASA Insignia contains the following elements: The sphere represents a planet, the stars represent space, the vector represents aeronautics, and the orbit represents space travel.

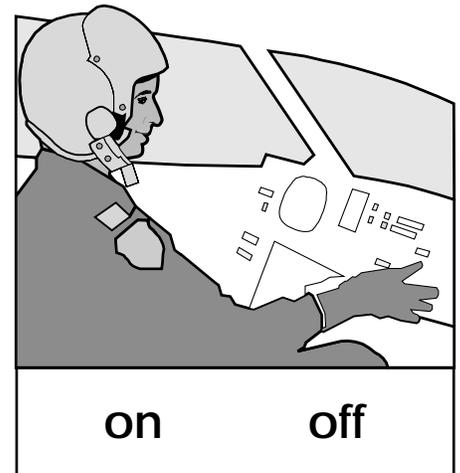
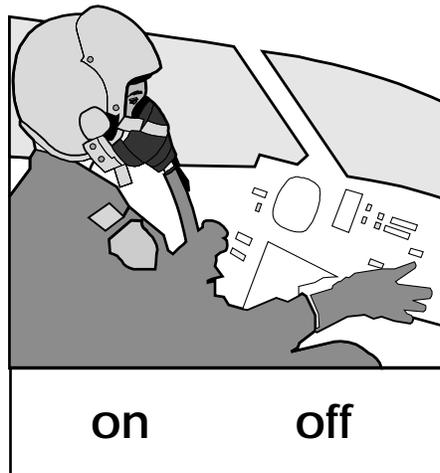
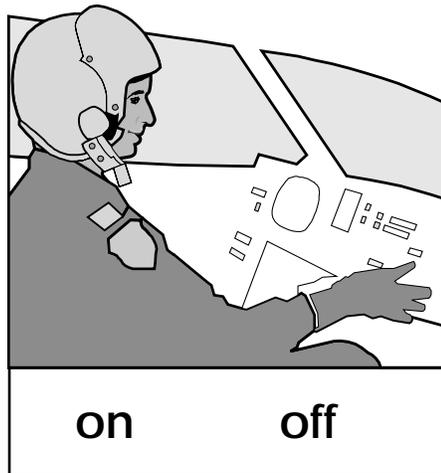
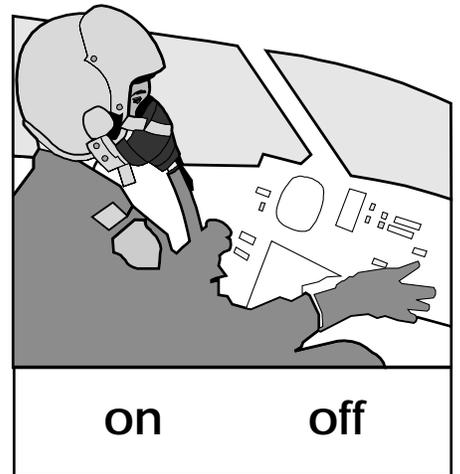
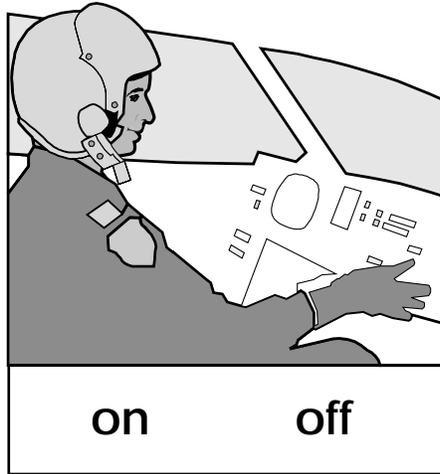
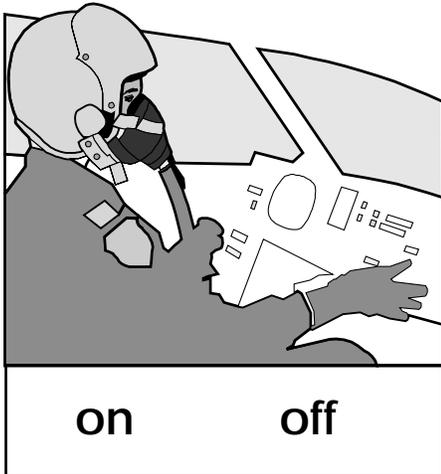


oxygen mask

Does the pilot have his **oxygen mask** on or off? Under each picture, circle the word **on** or **off**.

How many pilots have their oxygen masks on? ____

How many pilots have their oxygen masks off? ____



Pp Pp

pilot

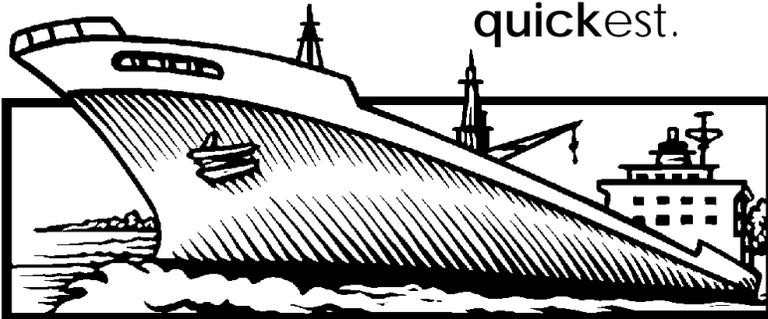
A **pilot** uses instruments in the cockpit to fly. Color the circles green, the squares red, the triangles yellow, and the rectangles blue.



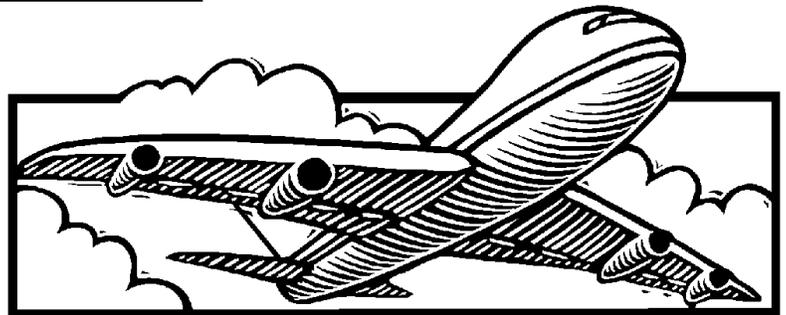
Qq

quick

Your family is going on a trip far away. Under each picture is the time it will take each vehicle to get there. Circle the vehicle that will get you there the **quickest**.



2 weeks



2 hours

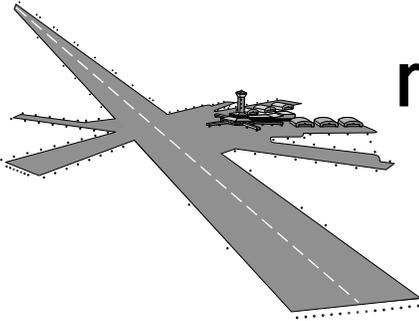


1 day



3 days

Rr Rr

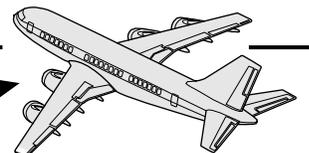


runway

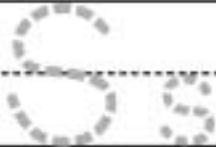
Help the airplane find the runway through the maze.



Start here

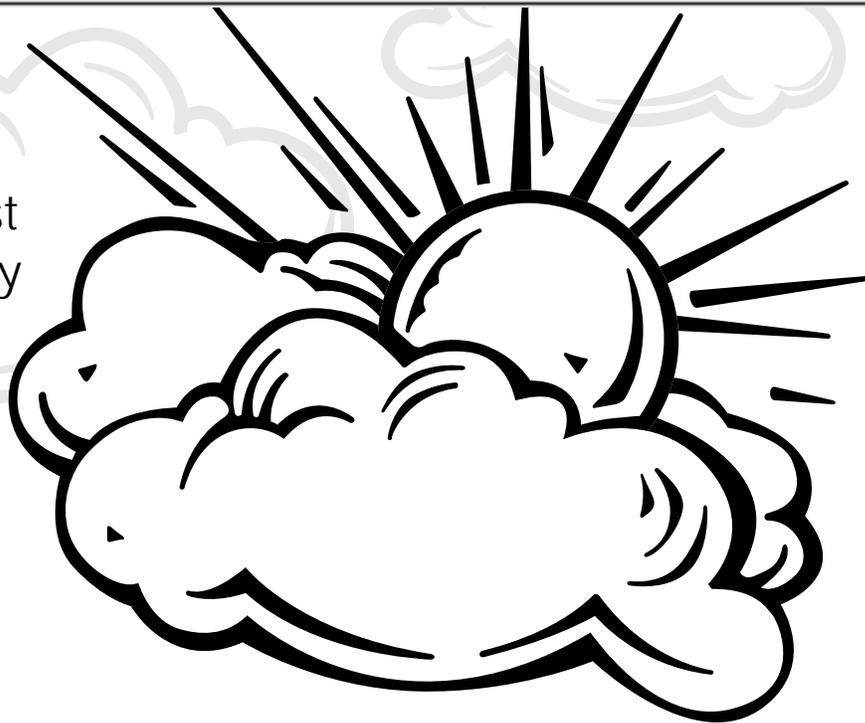


Ss



sky

Draw and color at least three things that can fly in the sky.

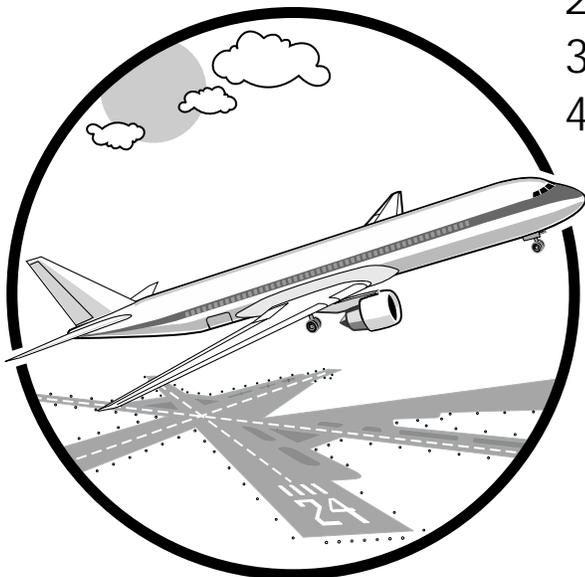


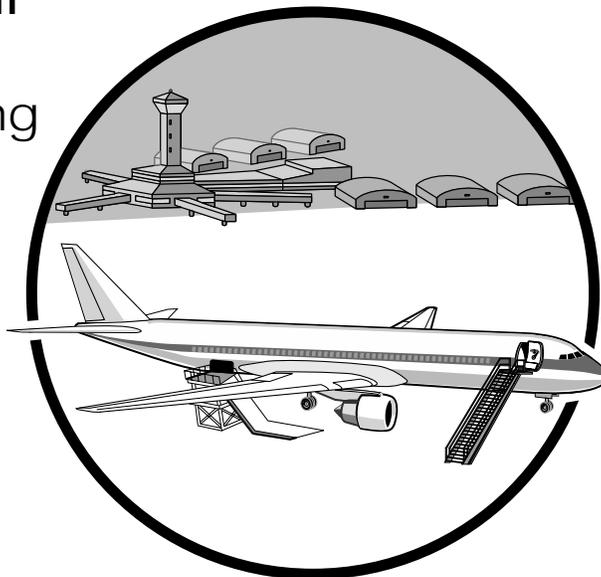
T t

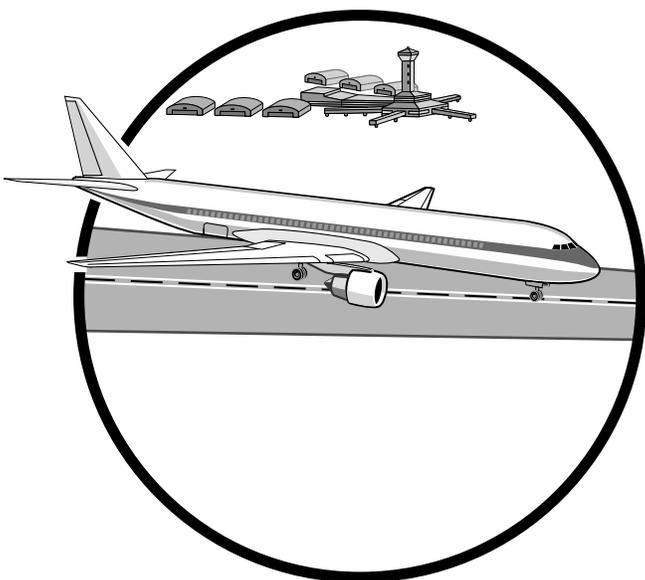
takeoff

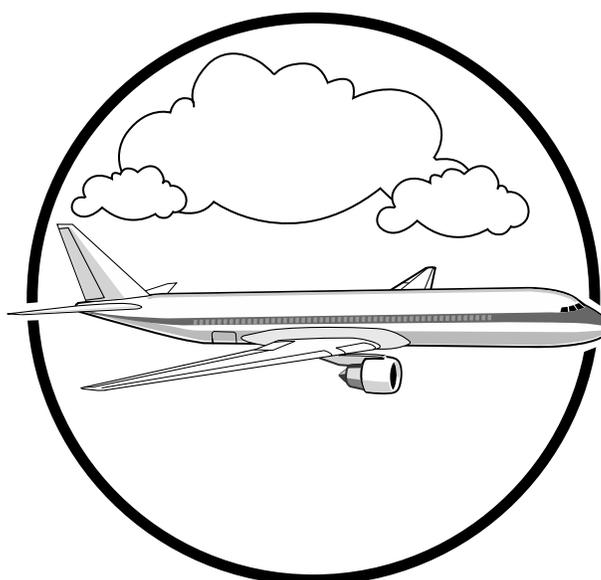
Write the number under the matching picture.

1. Loading
2. **Takeoff**
3. Flying
4. Landing





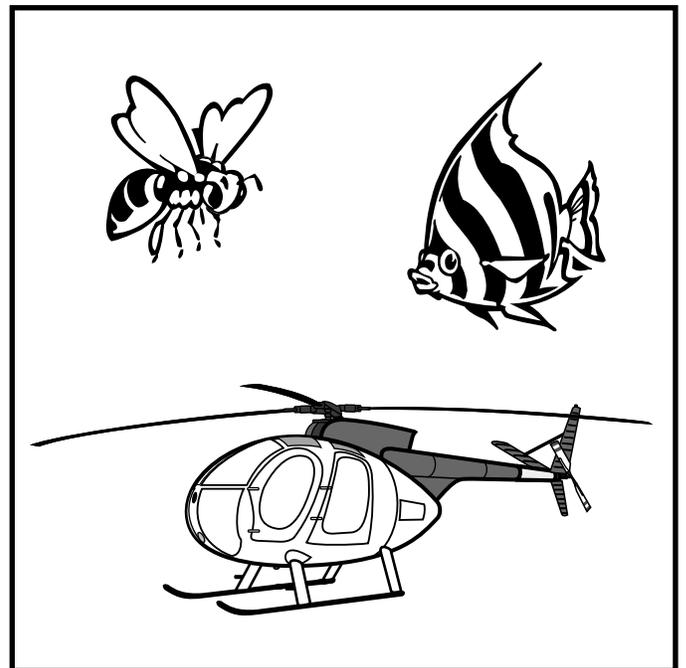
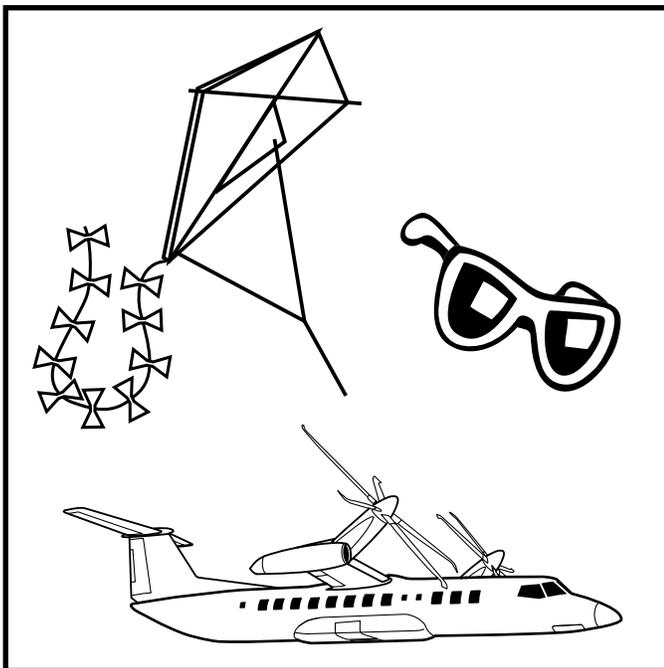
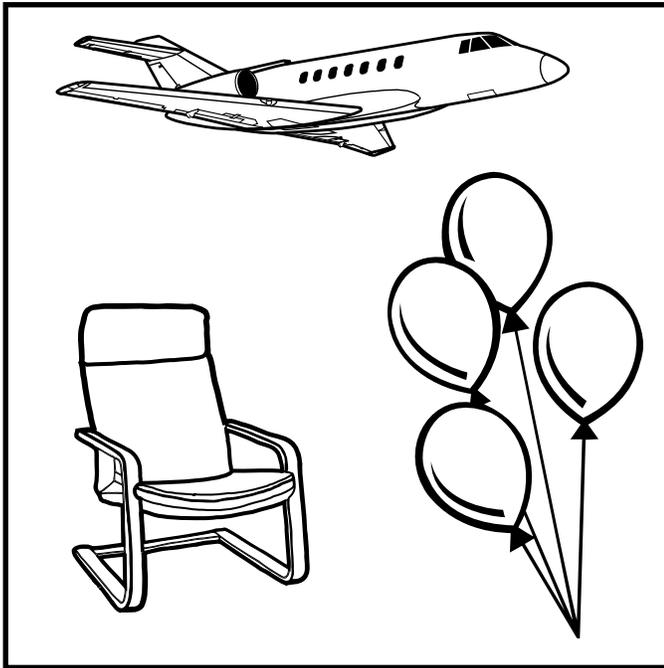


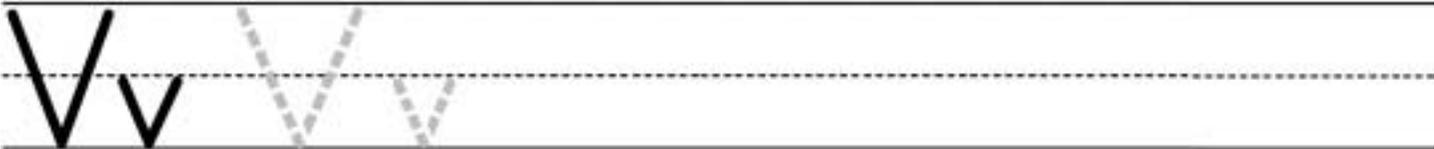


Uu Uu

up

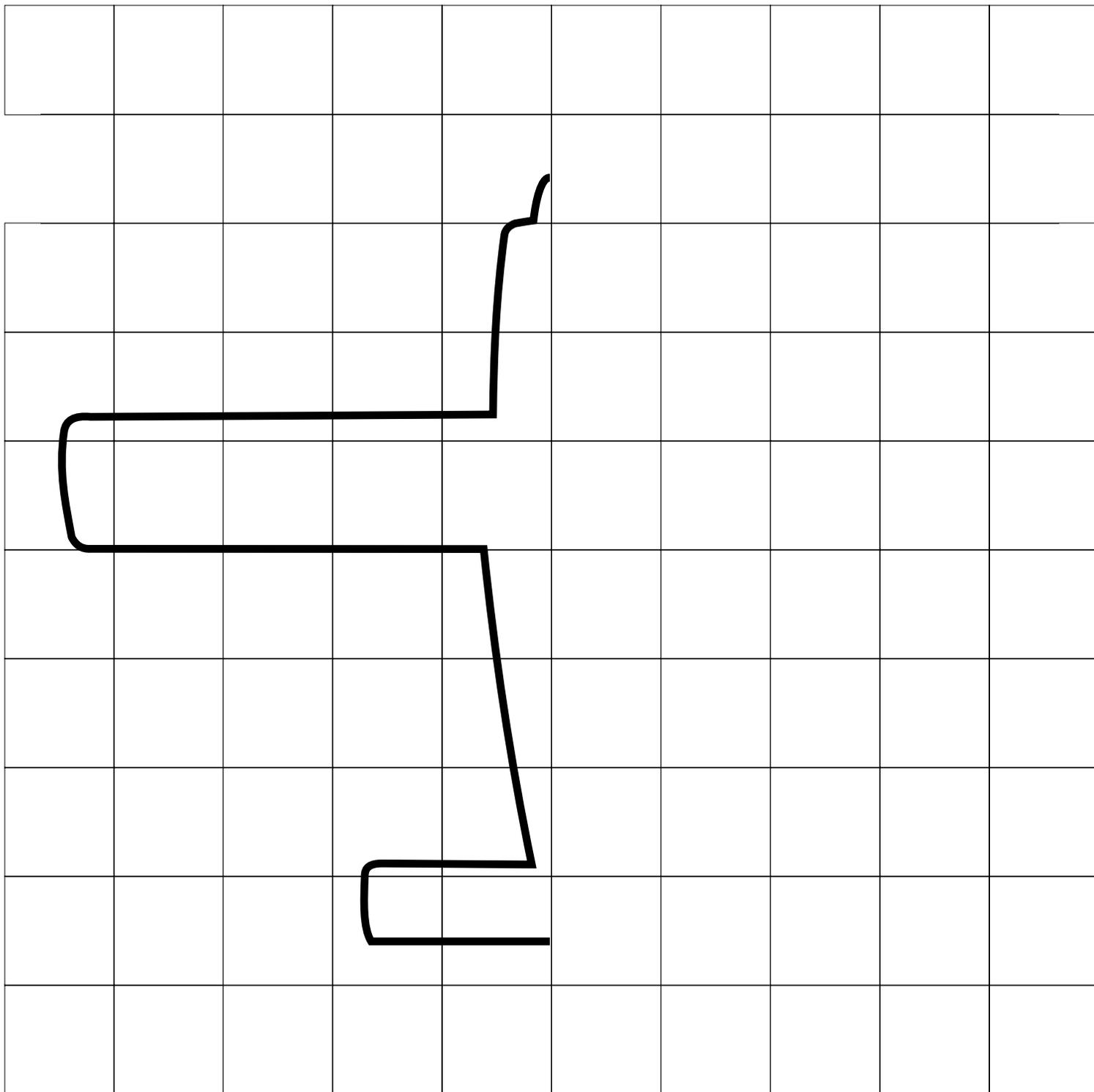
Circle the object in each group that does not go **up** in the air.





view

To complete the entire **view** of the airplane, draw the other half.

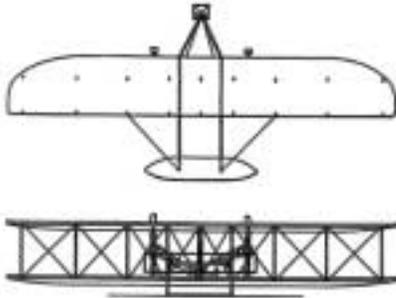


W w

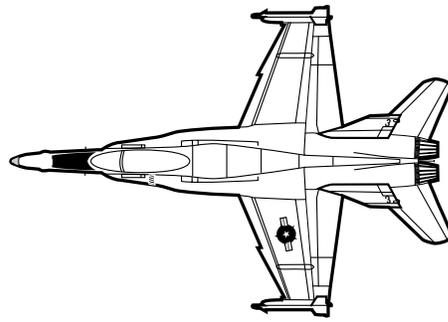
wing

Trace the different **wing** shapes.

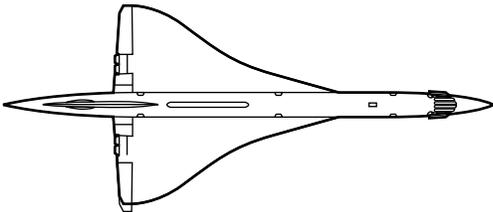
Wright Brothers



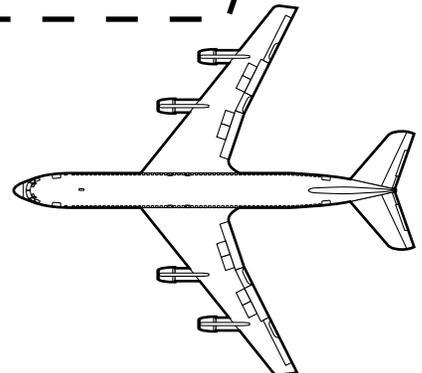
F-18
(Blue Angels)



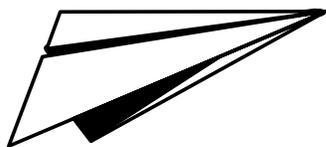
Concorde

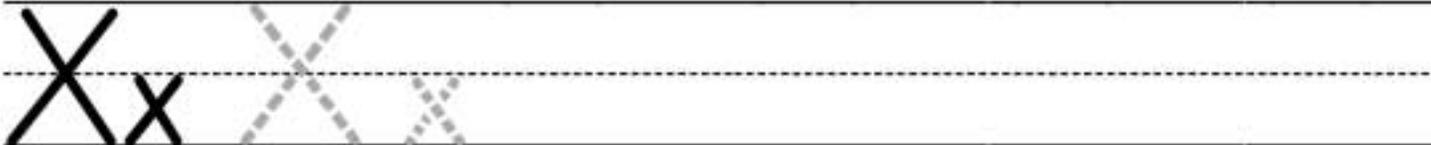


Boeing 747



Paper airplane

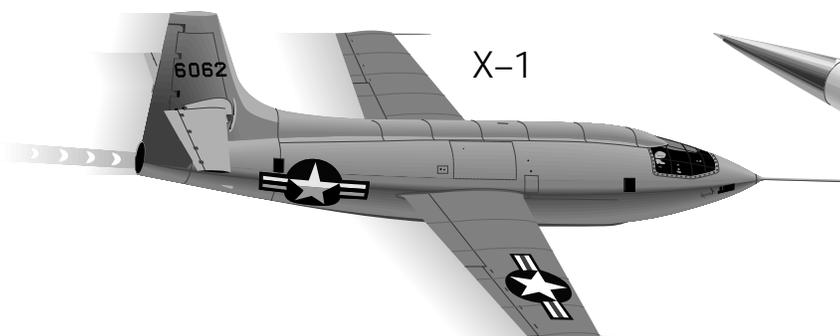




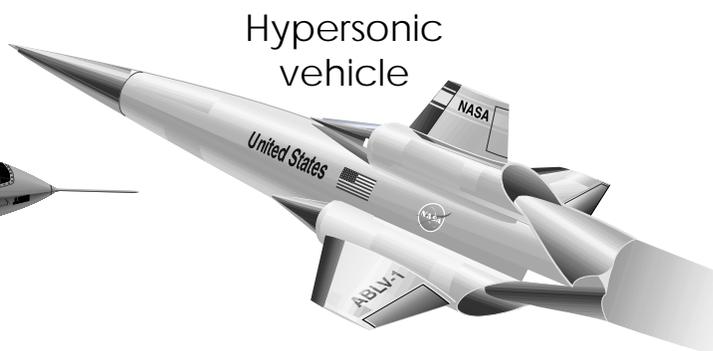
X-plane



X-30



X-1



Hypersonic
vehicle

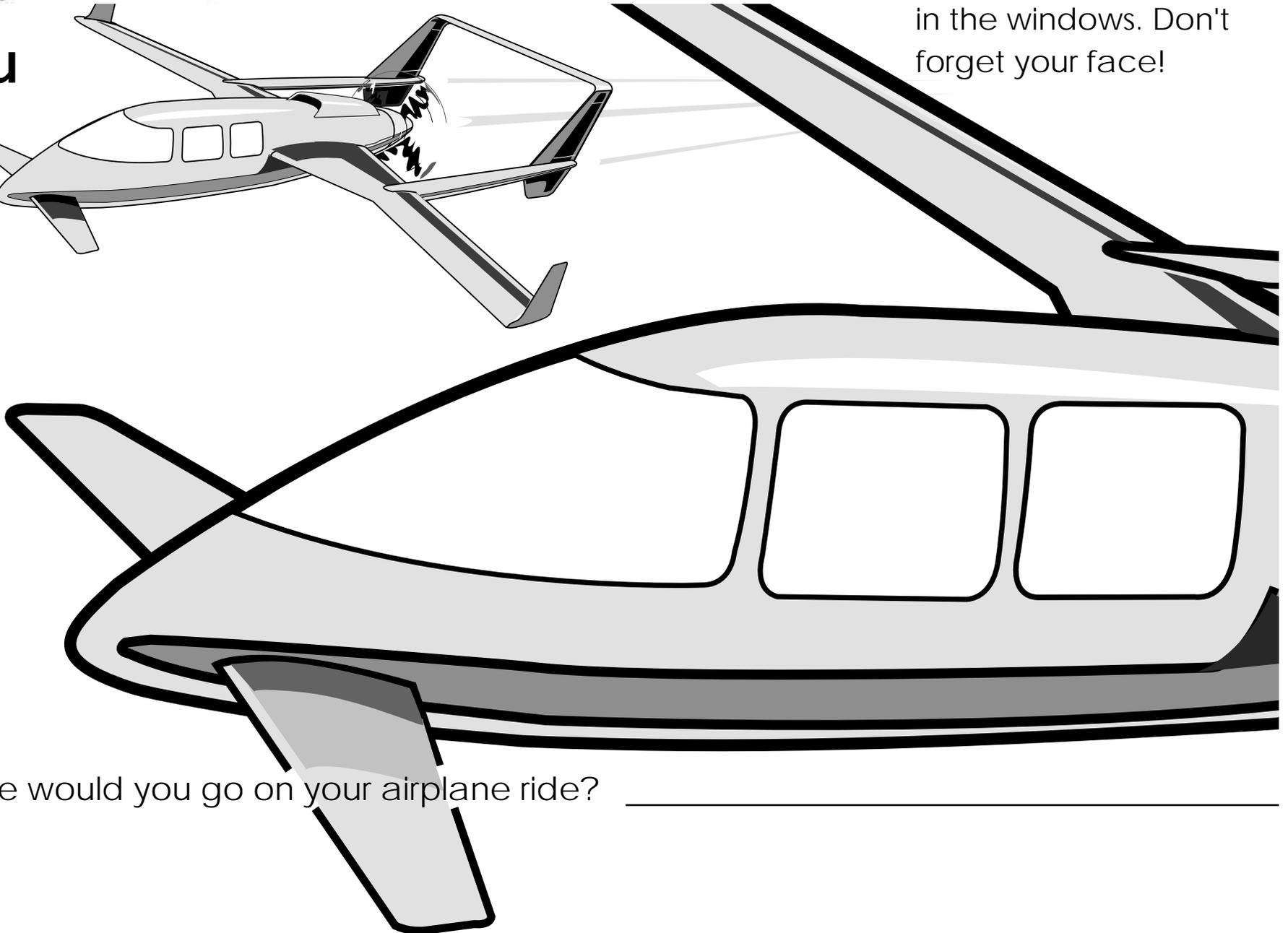
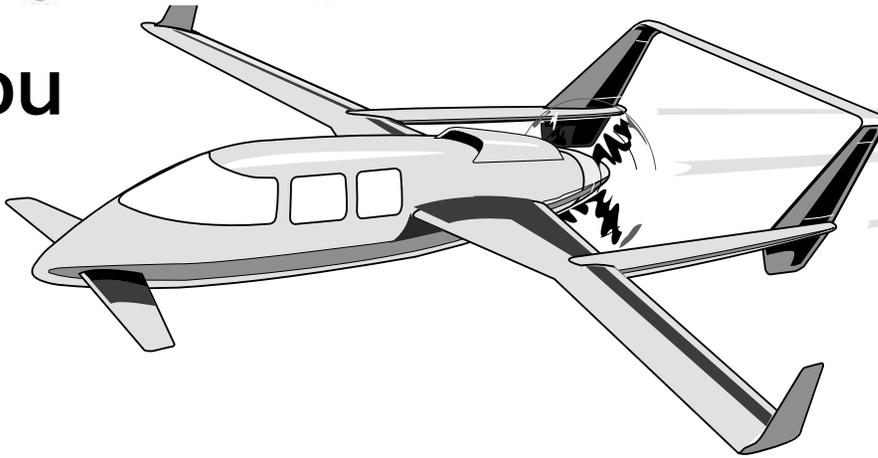
NASA uses test aircraft and space vehicles called **X-planes**. X-plane means experimental (X)-plane. Be an engineer and design your own X-plane in the space below. Give it an X-number and write it under your plane.

X- _____

Yy Yy

Would **you** like to take an airplane ride? Who would you take with you? Draw their faces in the windows. Don't forget your face!

you

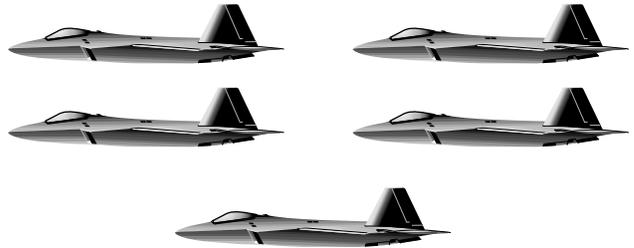
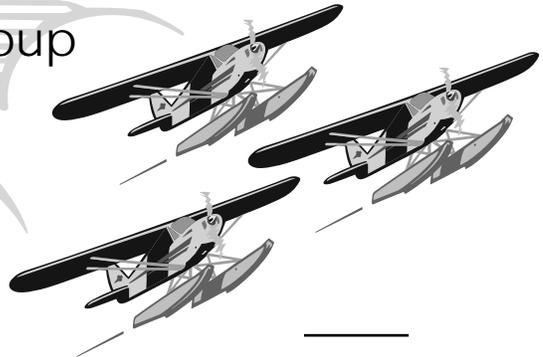


Where would you go on your airplane ride? _____

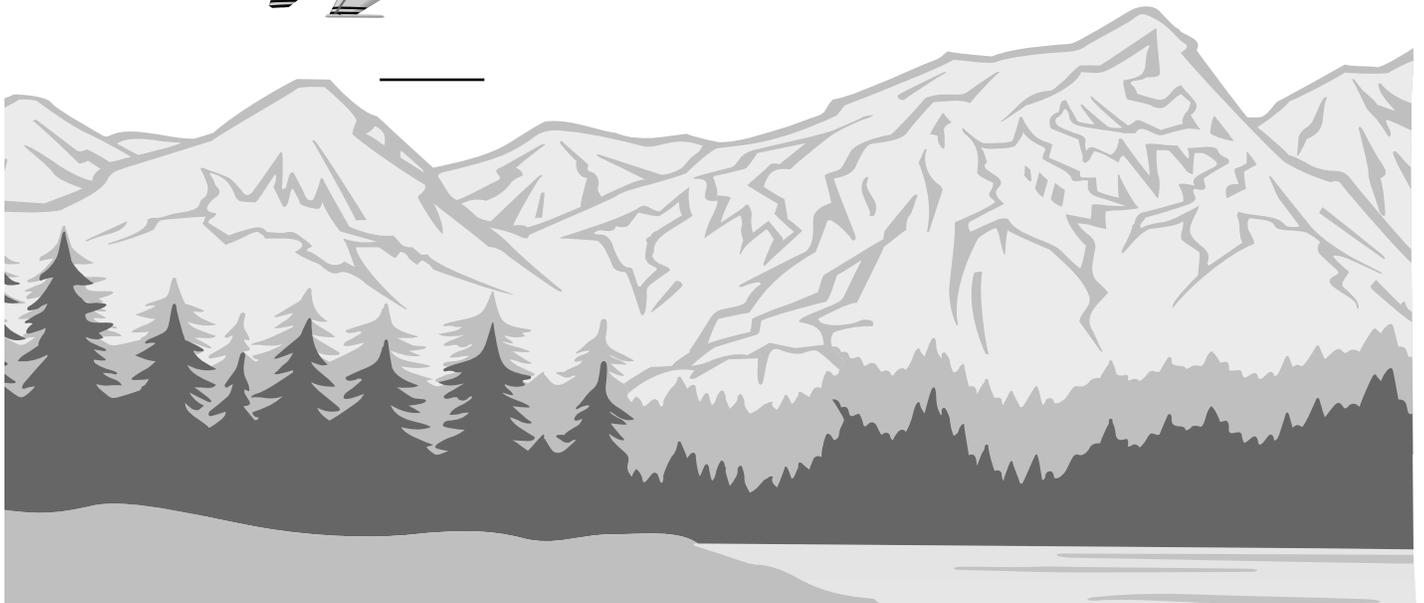
Zz Zz

zoom

Count the number of airplanes in each group as they zoom by.



How many airplanes did you count? _____



Aa aircraft

Aa aircraft

Bb balloon

Bb balloon

Cc clouds

Cc clouds

Dd down

Dd down

Ee engine

Ee engine

Ff fly

Ff fly

Gg glider

Gg glider

Hh helicopters

Hh helicopters

Ii in

Ii in

Jj jet

Jj jet

Kk kite

Kk kite

Ll landing

Ll landing

Mm mechanic

Mm mechanic

Nn NASA

Nn NASA

Oo oxygen

Oo oxygen

Pp pilot

Pp pilot

Qq quick

Qq quick

Rr runway

Rr runway

Ss sky

Ss sky

Tt takeoff

Tt takeoff

Uu up

Uu up

Vv view

Vv view

Ww wing

Ww wing

Xx X-plane

Xx X-plane

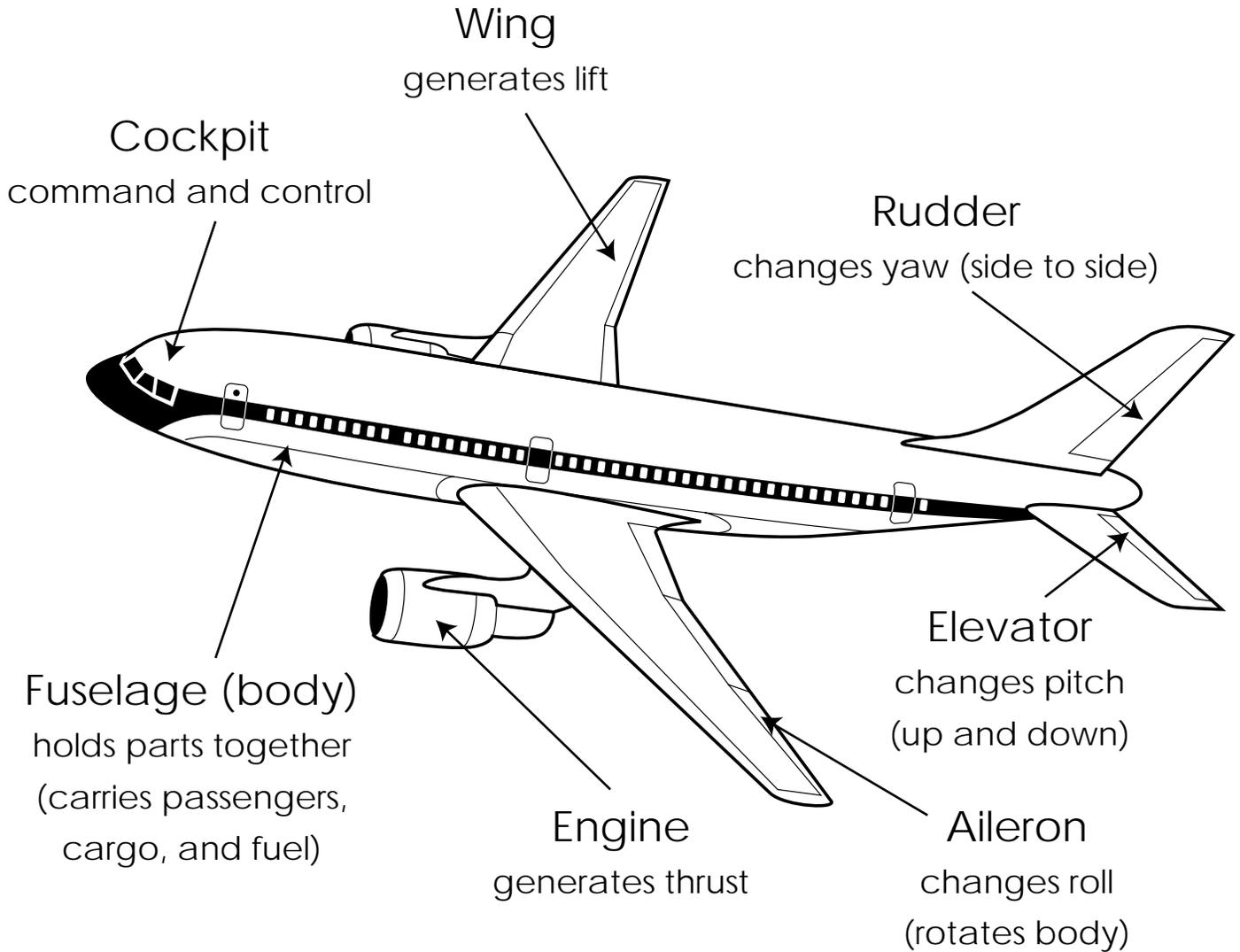
Yy you

Yy you

Zz zoom

Zz zoom

Airplane parts definitions



GLOSSARY



Aeronautics

The science of making and flying aircraft

Aileron

A hinged flap on the back edge of the wing of an airplane: it is moved up or down in keeping the airplane steady or in making a turn in the air (refer to picture on page 40)

Aircraft

1. An item that you can fly or float through the air
2. Any machine for flying

Airplane

An aircraft that is kept up by the force of air upon its wings and driven forward by a jet engine or propeller

Balloon

A large bag or rubber sack that is filled with air or other gases causing it to rise and float in the air

Cloud

White or gray objects that float in the air and contain tiny water drops

Cockpit

A place where the pilot or crew sits to control the aircraft apart from the passengers (refer to picture on page 40)

Elevator

A part of the tail of an airplane that can be moved to make the airplane go up or down (refer to picture on page 40)

Elevon

A control surface on an airplane that combines the functions of an elevator and an aileron

Engine

A machine, such as an aircraft engine, that uses energy of some kind to create motion and do work (refer to picture on page 40)

Engineer

A person trained and skilled in the design, construction, and use of engines or machines, or other devices of industry and everyday life

Experimental

Having to do with a test or series of tests to find out if something is correct

**Fuselage**

The main structural body of an aircraft to which the wings and tail are attached (refer to picture on page 40)

Glider

An aircraft that has no engine and is carried along by air currents

Helicopter

A kind of aircraft that has no wings and a large propeller fixed above it, that can be flown backward, forward, straight up and down

Instruments

A mechanical or electronic measuring device used to give the pilots information they need to fly their airplanes safely

Jet

An airplane that moves very quickly, jet propelled

Kite

A tethered glider that is lifted by the wind

Landing

The act of coming down after flying

Loading

Putting something to be carried into or upon an aircraft

Luggage

The suitcases, trunks, baggage, and belongings of a passenger

Mechanic

1. A worker skilled in making, using, or repairing machines, vehicles, and tools
2. A person who repairs and maintains aircraft

Oxygen mask

A mask placed over the mouth and nose and through which oxygen is supplied from an attached storage tank

Parachute

A large cloth device that opens up like an umbrella and is used for slowing down a person or thing dropping from an airplane

Passenger

A person traveling in an airplane but not helping to operate it

**Pilot**

A person who operates an airplane, balloon, or other aircraft

Propeller

A set of blades driven by an engine that pull or push an airplane through the air

Runway

A surface on the ground specifically used for aircraft takeoffs and landings

Rudder

A hinged, vertical flap at the rear of an aircraft, used for steering (refer to picture on page 40)

Seaplane

Any airplane designed to land on water and take off from water

Takeoff

The act of rising from the ground, especially in an aircraft

Vehicle

An object that moves people, such as an automobile, bicycle, or aircraft

View

A way of seeing or looking at something

Wing

The part of an airplane which produces lift (refer to picture on page 401)

X-plane

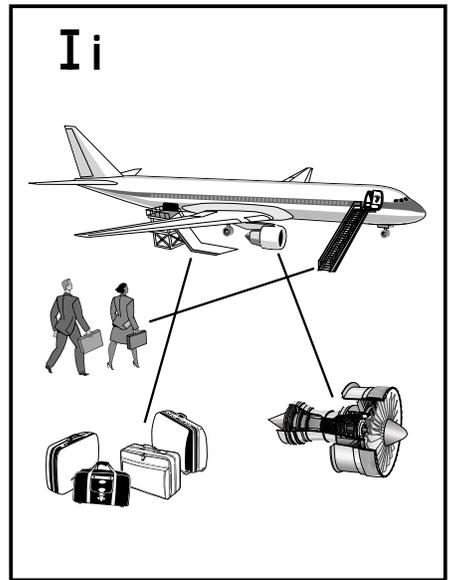
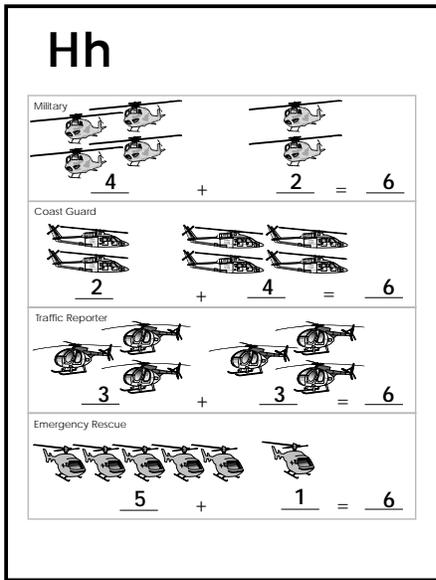
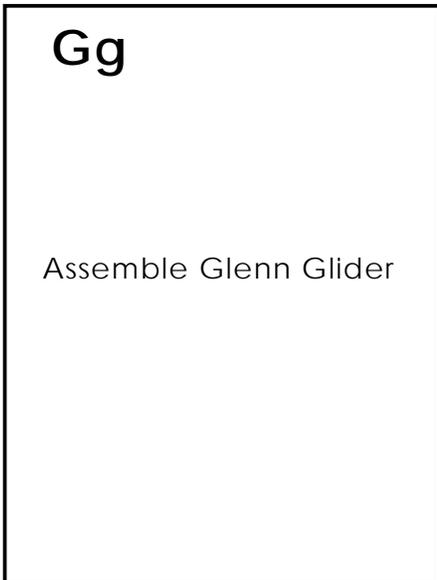
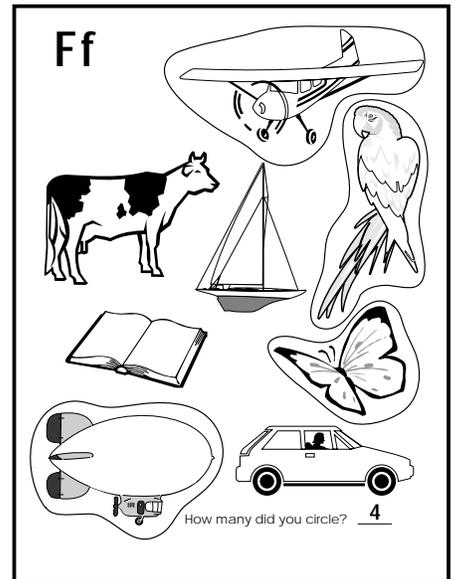
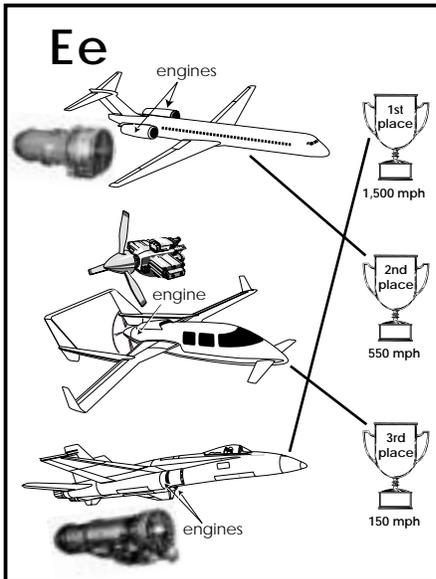
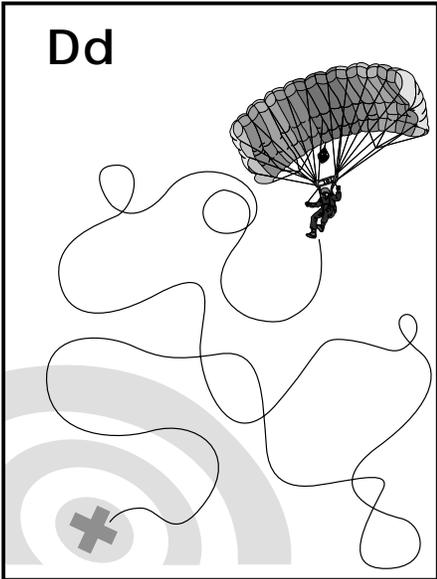
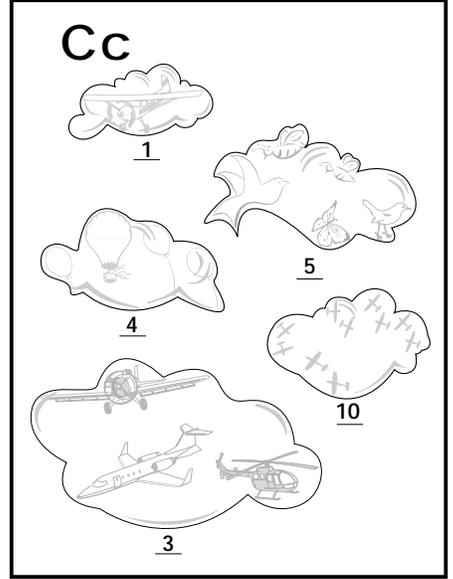
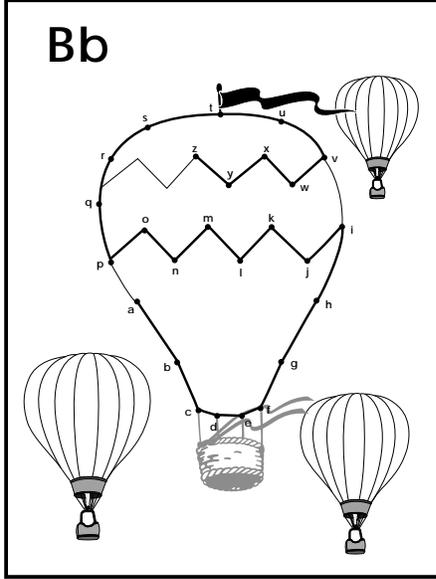
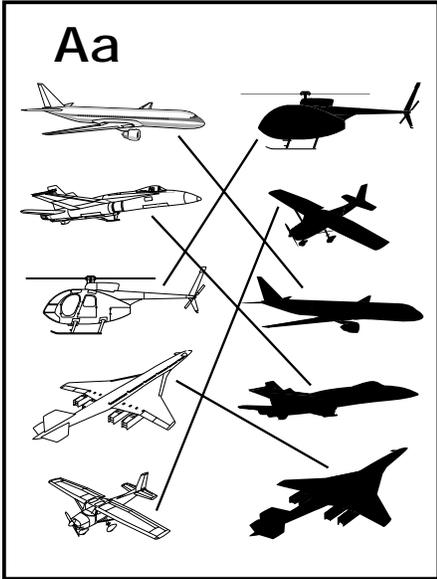
A special vehicle designed for experimental flight tests

Source definitions:

"Webster's Student Dictionary," SMITHMARK Publishers, New York, NY, 1999.
<http://www.dictionary.com>

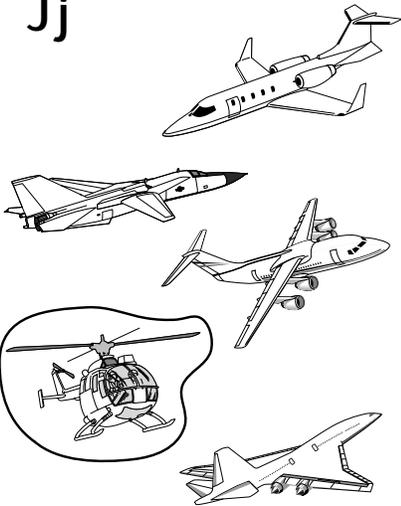
"Flight," The Nature Company Discoveries Library, Time-Life Books, 1995.

Little Explorers Picture Dictionary from EnchantedLearning.com
<http://www.littleexplorers.com/Dictionary.html>

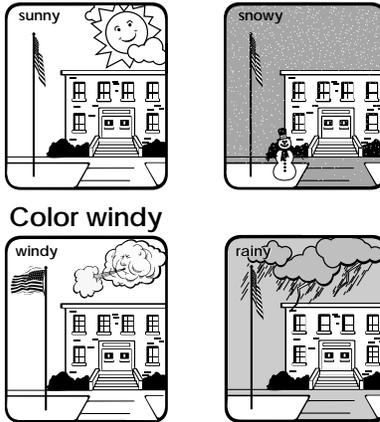


Answer page

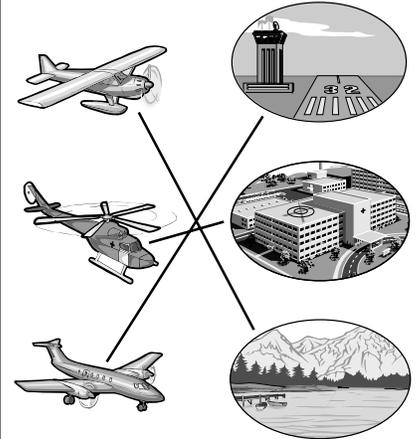
Jj



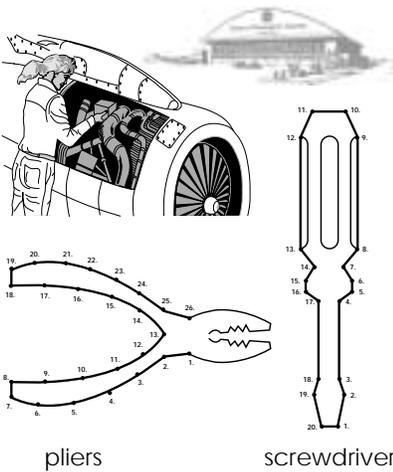
Kk



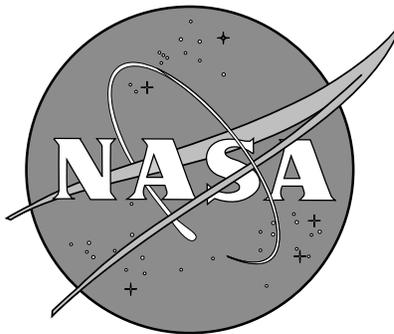
Ll



Mm



Nn

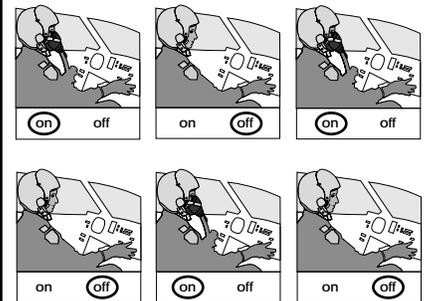


Oo

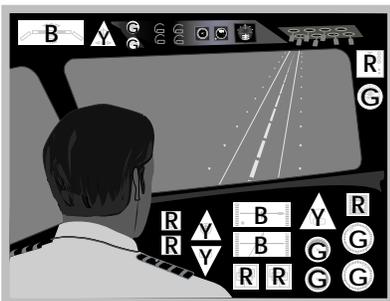
Does the pilot have his oxygen mask on or off? Under each picture, circle the word **on** or **off**.

How many pilots have their oxygen masks on? 3

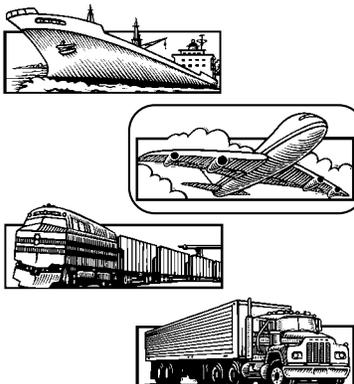
How many pilots have their oxygen masks off? 3



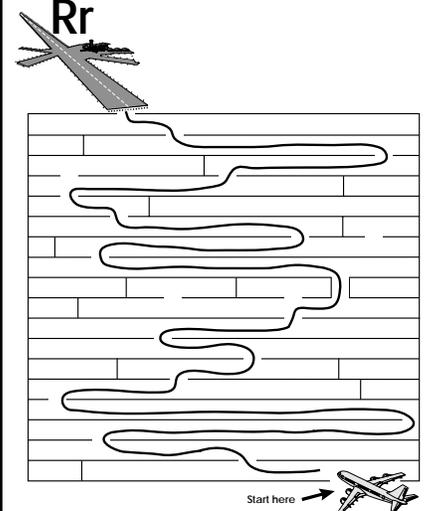
Pp



Qq



Rr



Answer page

Ss



Your own drawings here.

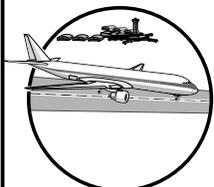
Tt



2



1

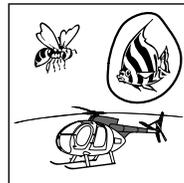
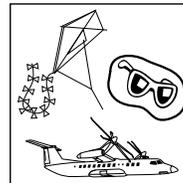
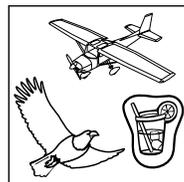
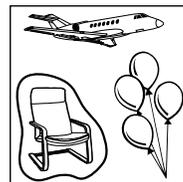


4

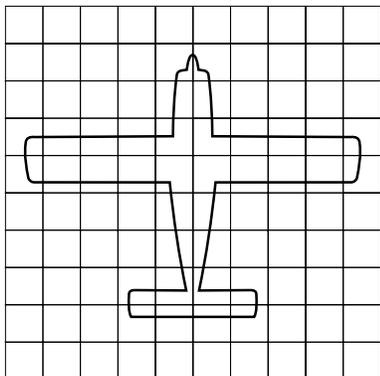


3

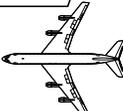
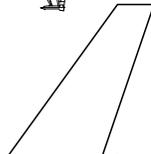
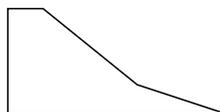
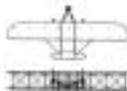
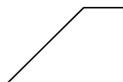
Uu



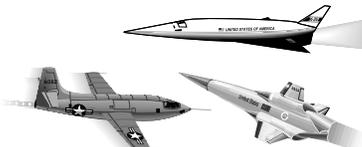
Vv



Ww

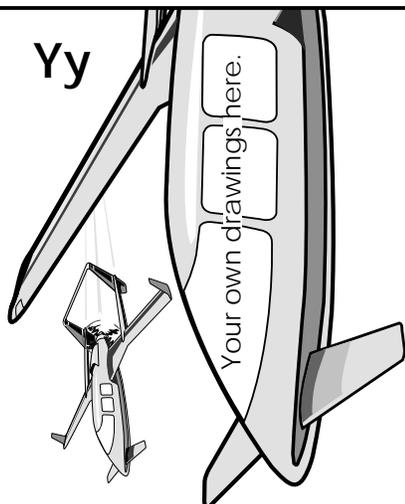


Xx

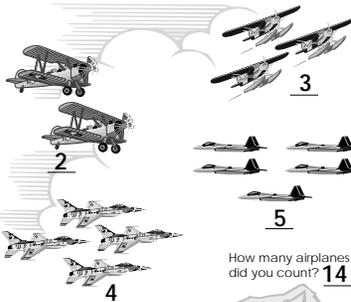


Your own drawing here.

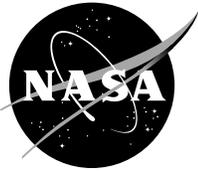
Yy



Zz



How many airplanes did you count? **14**



Congratulations

on completing the

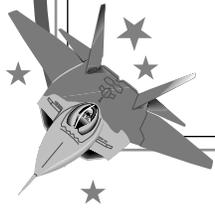
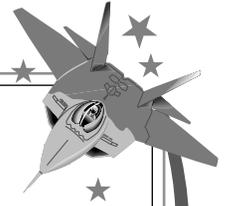


Activity Book



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Glenn glider

